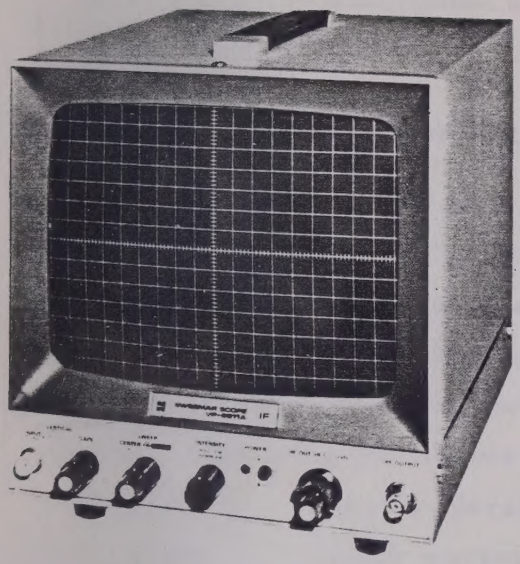
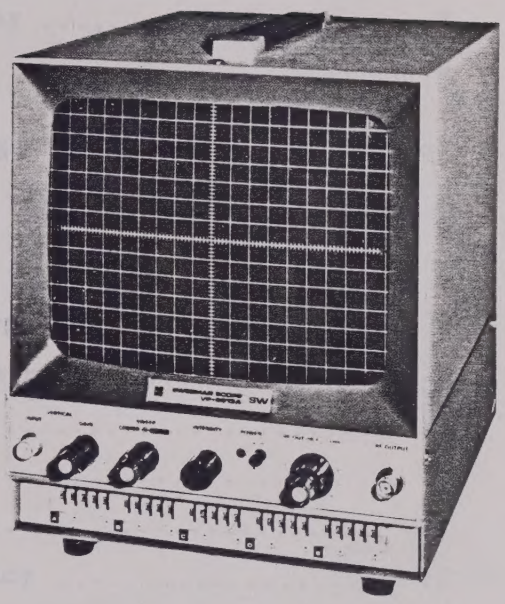
SWEEMAR SCOPE

VP-8911A VP-8912A
VP-8913A VP-8914A



VP-8911A IF Band



VP-8912A LW-MW Band

VP-8913A SW Band

VP-8914A FM Band

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Section 1. CHECKING FOR PROPER LINE VOLTAGE AND PROTECTING ATTENUATOR

AC power supply

The Sweemar Scope in this series is designed to operate on a 100 V, 115 V, 215 V, or a 230 V AC power supply depending on position of line voltage selector. The unit is normally shipped from the factory set to operate on a line voltage of 100 V.

When a modification is made to permit the unit to be operated at a voltage other than 100 V, a tag indicating the prescribed voltage is attached to the end of the power cord.

The voltage range indicated by the arrow of the line voltage selector plug located on the rear panel of this unit is the operating voltage. Prior to use, make certain this indication matches the line voltage.

Protecting attenuator

The attenuator circuit used in the units of this series is electronic, and compared to the older units, is much easier to handle, however, an external voltage applied to the output cable terminal may destroy the attenuator circuit. Be particularly careful not to let any voltage potential contact with this terminal.

Section 2. GENERAL

2.1 General description and features

The Sweemar Scope VP-8910A series has combined the sweep signal generator, monitor scope, and the variable marker circuit into one cabinet, and as a sweep signal generator, possesses a number of new functions.

One of the shortcomings found in the previous sweep signal generators has been the difficulty in changing the marker frequency. This has been solved by use of the digital - type variable marker circuit. The digital switch located under the front panel may be changed in steps of 1 kHz in the LW-MW and the SW band, and in 10 kHz steps in the FM band. This allows the user to freely make the desired marker frequency settings and readings, while the accuracy and stability of the crystal resonator type marker is maintained. Consequently, maintenance for marker frequency change is not necessary, effectively increasing the in-use time of the equipment.

Also, the 9-inch, large screen monitor included in one cabinet has made a smaller and more lightly constructed unit available than conventional "genescopes". The cables required to this Sweemar Scope are only two, one from sweep signal output and the other for detected signal from the device being measured, making the reshuffle of the equipment due to changes in the production line more simple. The units may also be used effectively on the workbench.

Other features include a sweep signal output (RF signal) of 100 mVrms, built-in 80 dB electronic attenuator which may also be remotely controlled, and the accuracy of the tracking adjustment has been increased by slowing down the sweep rate only in the areas close to the marker frequencies.

Such new functions make this sweep signal generator with monitor valuable for assembly of radios, filters, and other components.

Features:

[1] Built-in digital-type variable marker generator circuit.

[2] High-precision, highly stable marker.

[3] Marker circuit covering a wide range of frequency.

[4] High-precision tracking measurement.

[5] Built-in electronic-type attenuator which may be controlled remotely.

[6] Combined monitorscope.

[7] A series covering all radio frequency bands.

2.2 Specifications

	VP-8911A		AP-8912A	VP-8913A	VP-8914A
Sweep frequency					
Frequency range	415~ 485kHz	10.25~ 11.15MHz	130~ 1,800kHz	1.5~ 29.9MHz	75~ 110MHz
Center frequency range	445~ 465kHz	10.55~ 10.85MHz	180~ 1,700kHz	2.5~ 29MHz	76.5~ 108.5MHz
Sweep width	25~60kHz	0.4~ 0.9MHz	0.3~ 1.5MHz	2~15MHz	3~35MHz
Band selector	NORM-AM PULL-FM				
Sweep output					
Output voltage	100dB (0.1Vrms) into 50Ω band				
Output impedance	50Ω				
Attenuator	10 dB steps, 7 ranges 0 to 10dB continuously variable				
Marker section					
Frequency	455kHz ±5kHz, ±10kHz	10.7MHz ±75kHz, ±150kHz	Any frequency within the sweep range		
Setting	Fixed	Fixed	4-digit digital switch	5-digit digital switch	
Minimum interval			1kHz		10kHz
Frequency accuracy	±0.01%		±0.05%		
Number of markers	5 points simultaneous				
Marker type	Intensity modulation				
Monitor section					
Sweep repetition rate	25Hz/30Hz				
Sweep waveform	Sawtooth wave				
Duty cycle	Approx. 1 : 19				
Vertical axis sensitivity	10 mV/DIV. variable				
Vertical axis frequency range	DC ~ 5 kHz (5 DIV.)				
Vertical axis input impedance	Approx. 500 kΩ				
Horizontal axis amplitude	Over 17 DIV. (Fixed)				
CRT	9-inch, 90° electro-magnetic deflection cathode-ray tube				
Power supply					
Voltage	100V, 115V, 215V, 230V each ±10%				
Frequency	50Hz/60Hz				
Power consumption	less than 45 VA				

	VP-8911A	VP-8912A	VP-8913A	VP-8914A
Dimensions/Weights				
Height	230mm	260mm		
Width	225mm			
Depth	310mm			
Weight	Less than 8 kg			
Accessories	Hood 1			
	Fuse 1			
	Instruction manual 1			
	AF cable (red) 1			
	RF cable (black) 1			

Section 3. OPERATING INSTRUCTIONS

3.1 Installation

Prior to permanently installing the Sweemar Scope on the workbench, the following items should be noted.

A location should be selected where reflections from the lighting in the area will not make the CRT display hard to watch. The accessory hood may be used to eliminate most reflections. (Refer to Section 3., Item 3.5). The stand attached to the bottom plate may also be used to make the CRT easier to see.

3.2 Checking the power supply

Prior to performing the operational check, make certain the AC power supply voltage to the workbench is matched with the main power supply setting of the unit and that the rating of the fuse is correct.

3.2.1 Setting main power supply voltage

The Sweemar Scope series is designed to be operated with power supply voltages of 100 V, 115 V, 215 V, or 230 V by changing the connection of line voltage selector located on the rear panel. The voltage the unit has been set at is indicated by the arrow located in the LINE VOLTAGE indicator plate on the rear panel. If it does not agree with the line voltage to be used, it should be set using the following procedures.

1. Remove the LINE VOLTAGE indicator plate from the rear panel of the unit.
2. Pull out the plug with the arrow on it, turn it to the correct voltage indication and re-insert it.

3. Make certain the LINE VOLTAGE plate is tightened down before using the unit.

3.2.2 Main power supply fuse rating

A fuse is built into the fuse holder fixed to the rear panel, to which the main power supply cord is connected.

When changing the voltage of the main power supply, or using the equipment for the first time, always make certain the power supply voltage and the fuse rating is correct.

Main power supply voltage	Fuse rating	Fuse designation
100 - 115V	1 ampere	125V, 1A
215 - 230V	0.5 ampere	250V, 0.5A

3.3 Controls and Connectors

A front and rear panel diagram is included in the folding pages located at the back of this manual. The numbers used in the explanation that follows correspond to the numbers of the controls and connectors in the diagram and should be referred to while the nomenclature and operating procedure is explained in this section.

Front panel

① RF OUTPUT ..... Sweep signal output terminal. An output voltage of 100 mVrms (50Ω load termination) may be obtained with all models of the series.

② ATT dB ..... 10 dB step attenuator. Turning this control counterclockwise provides 70 dB of attenuation. Since it is an electronic type attenuator, remote control of

attenuation is possible by removing the switch and level controller from front panel and using an extension cord.

③ LEVEL ..... Dual shaft consisting of the 10 dB continuously variable attenuator and the step attenuator. The inner shaft is the 10 dB continuously variable attenuator, and the outer shaft is the step attenuator. Turning the control clockwise reduces the attenuation and increases the level.

④ CENTER ..... This control adjusts the center frequency of the sweep signal oscillation. Turning the control clockwise increases the frequency.

SWEEP

⑤ WIDTH ..... This control is used to adjust the sweep frequency range of the sweep signal oscillation. Turning the control clockwise makes the sweep width wider and the space between the markers more narrow.

⑥ INTENSITY ..... This control adjusts the intensity of the brightness on the monitor. Turning the control clockwise increases the intensity.

⑦ PULL-FM ..... This function is only available on the VP-8911A IF Sweemar Scope. In the pushed-in position, AM-IF is obtained from the RF output terminal, and in the pulled-out position, FM-IF is obtained. This switch also serves as the INTENSITY control, with the intensity being adjustable while the switch is in either position.

NORM-AM

⑧ (Power pilot) ..... This lamp lights when the power is ON.

⑨ POWER ON/OFF ..... When the power switch is in the ▬ position, the power is ON, in the ▮ position, the power is OFF. The power is OFF when the shaft is popped out.

⑩ GAIN ..... This is the gain control for the vertical axis. Turning the control all the way to clockwise brings it to a calibrated sensitivity of 10 mV/DIV. Counter-clockwise (CCW) rotation lessens the sensitivity, and if turned completely CCW, over 40 dB of attenuation is obtained.

⑪ ▮ ..... This is the vertical position control for the monitor. Turning the control clock-wise moves the trace toward the top of the screen.

⑫ V. INPUT ..... This is the input terminal to the vertical axis of the monitor. Because of its high input impedance, approximately 500 kΩ, it affects the device being measured very little.

⑬ (Digital switch) .... This switch is used for setting the marker frequency in the variable type marker circuit. Provided on all units except the VP-8911A IF Sweemarscope, the details and operating procedure may be described in Item 3.4 of this manual.

Rear panel

⑭ (Power cord) ..... This is the main power cord and is fitted with a 3-prong grounded plug.

⑮ FUSE ..... This is the primary-side fuse. The rating of the fuse used should be in accordance with the main power voltage.

⑯ (Ground terminal) .. The ground terminal provided on the cabinet should always be connected to ground for safety.

⑰ LINE VOLTAGE selector ..... This plug and socket type device is used to convert the voltage of power transformer primary winding of the unit to make it operate from a deferent voltage. The plate is fixed on by two screws, and the voltage indicated by the arrow is the voltage the unit is presently set to operate at.

3.4 Operating procedure

3.4.1 General operations

(1) Prior to turning on the power switch, set all the controls to the positions indicated below.

Front panel	Controls	Position
	ATT dB	100 dB
	LEVEL	CAL
	SWEEP CENTER	Center
	SWEEP WIDTH	Fully clockwise (CW)
	INTENSITY	Fully counterclockwise (CCW)
	GAIN	Anywhere
	⏚	Center
Rear panel	LINE VOLTAGE	Set to line voltage

(2) Press the POWER ON.OFF switch.

(3) Watching the CRT screen, adjust the INTENSITY to a level easy to see. Since the horizontal axis is connected internally in the unit, no horizontal position or horizontal gain adjustments will be necessary. The vertical position is adjusted by turning the control with a ⏚ mark on it. Set it to the proper position.

3.4.2 Setting marker frequency

(1) The marker frequency is pre-set internally in model VP-8911A IF Sweemar Scope and needs no further attention. Whereas on the other models, the setting is made using the digital switches located under the front panel.

(2) The digital switches are divided into five divisions by every 4 or 5 digits with each division being indicated with the letters A, B, C, D, and E from the left respectively, and the frequency units are noted with the marks MHz or kHz.

(3) When setting the marker frequency, always start with the lowest value in the A division, assigning the lowest marker frequency in this division. Then working toward the right, gradually set the frequency to a higher setting.

(4) Since the digital switch has no locking mechanism, it may be set on any value from 0 to 9, however, it should be set within the sweep frequency range for each of the A, B, C, D, or E divisions. When set outside this range, the marker will fail to appear or it could result in an error in the operations. When this happens, returning the digital switch back to a value within the sweep frequency range will restore normal operations.

(5) Some of the errors that may occur due to a faulty frequency setting are;

(a) The digital switch being set to a value lower than the sweep frequency range will result in the marker being at the left edge of the trace. A correct value will not be indicated in this case.

(b) The digital switch being set to a value higher than the sweep frequency range will result in the marker disappearing off the right hand side of the screen.

(c) If the digital switches in both A and B divisions are set to the same value, the two markers will not overlap, but appear apart with a fixed space between them. When the A division digital switch is gradually set higher, the B marker will move to the right as if it were being pushed. Naturally this will result in an error.

(6) When the markers have a fixed space between them, the digital switch of the lowest frequency marker must be set to the far left position and digital switches of higher frequencies must be set toward the right as noted in(3) above in order to restore normal operations.

(7) The marker to marker space cannot be set smaller than a certain value due to circuit design. This smallest marker to marker space is also relative to the sweep frequency range, and is obtained as a value of (sweep signal frequency range)/40.

(8) If sweep width of RF signal is more than five times the lowest set marker frequency, markers may flicker. In this case operation can be restored to normal by making the sweep width narrower with the SWEEP WIDTH control.

3.4.3 Setting sweep signal frequency range

(1) Starting from the left side A of the digital switch and working toward the right, increase the setting values in order of A, B, C, D, and E.

(2) When these 5 point markers are all set and displayed on the screen, adjust the SWEEP CENTER and the WIDTH controls located on the front panel.

(3) This completes the setting of the sweep signal frequency.

3.4.4 Measurement procedure

(1) The output voltage should be taken from the RF OUTPUT connector through either a loop antenna or RF cable attached as accessory, and then applied to the device to be measured. The output voltage of the units in this series is 100 mVrms when terminated by 50Ω load.

(2) The signal from the device being measured is passed through a detector, then applied to the V INPUT connector of Sweemar Scope.

(3) The attenuator value should be adjusted appropriately so that the device being measured does not receive excessive input. Also V. GAIN and the vertical positioning control of the monitor section should be set for the trace on the screen to be watched easily.

(4) Tracking adjustments may be made by changing the tuned frequency of the device being measured.

3.4.5 Notes on measuring

General

When using a sweep signal generator to make tracking adjustments, the amplitude of the characteristic curve on the screen will appear lower than it actually is. This amplitude drop would be compared with the measurement value obtained by using a standard signal generator by using the equation below.

$$a = \left\{ 1 + 0.195 \left(\frac{F}{TB^2} \right)^2 \right\}^{-\frac{1}{4}}$$

a : level drop ratio

F : Sweep frequency width (Hz)

T : Sweep rate (sec)

B : 3 dB bandwidth (Hz) of the device being measured.

The apparent bandwidth is calculated by the following equation.

$$= \frac{B}{a^2}$$

a : The level drop ratio obtained from the above equation.

B : 3 dB bandwidth (Hz) of the device being measured.

To make accurate measurements, it would be better to have slower sweep speed and narrower sweep width. However, in an actual measurement,there is a limit due to flicker of the trace and increase in measurement time.

For the ideal tracking adjustment in a radio receiver;

(1) Rotate dial of the radio receiver under test to tune it to a desired frequency.

(2) With the radio receiver left in the same state, apply the RF OUTPUT signal and observe the characteristic curve. Position the characteristic curve in the center of the screen by making sweep width narrow.

(3) The characteristic curve should appear on the screen as shown in the Fig. 3-4-1 below. Now changing the setting value of the digital marker switch, bring the marker to the highest point of the characteristic curve.

(4) Then restore the sweep width to normal by adjusting SWEEP WIDTH control.

(5) Sometimes marker may be seen shifted from top of the characteristic curve as shown in Fig. 3-4-2.

(6) In this case, move the marker to the top by resetting the digital marker switch as shown Fig. 3-4-3.

(7) This state faithfully represents the tracking marker, by this sweep generator, taking every factor like sweep time, bandwidth, delay etc. into consideration.

Fig. 3-4-1

Fig. 3-4-2

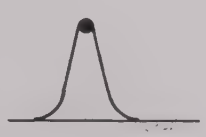


Fig. 3-4-3

The units in this series are swept by a sawtooth wave of 1/2 the line frequency (duty cycle 19:1), and have brought the sweep rate down to near the limit of flicker.

At marker points, sweep speed of horizontal sweep signal and sweep oscillation drive signal are slowed down for period of 1 msec, resulting in magnified amplitude of characteristic curve at marker points and more accurate marker frequencies.

3.5 Attaching light shield hood

The light shield hood is included as an accessory, and should be mounted on the unit to block unwanted light and make the screen easier to see. It is attached by the procedures listed below.

(1) Loosen 3 of the outer cabinet fastening screws from around the front panel. (1 on the top, and 1 on each side.)

(2) Match the hood to the 3 screws and push it back as far as it will go. Tighten the screws.

Section 4. MAINTENANCE

4.1 Adjusting inclination of trace

The horizontal trace may appear inclined on the screen due to the effects of earth magnetism etc. This will vary depending on the particular location the unit is used. However, when the horizontal trace is not parallel to the horizontal graticule, it must be adjusted using the following procedure.

(1) Remove the two screws from the top of the cabinet.

> NOTE DANGER
>
> The high-voltage CRT accelerator circuit is located inside this portion of the cabinet. Be particularly careful not to make contact with it.

(2) Loosen the hook-screw holding the deflection-yoke on the neck of the CRT. While observing the screen, bring the horizontal trace parallel to the horizontal graticule by rotating the deflection yoke in extremely small increments.

(3) When it is accurately matched, tighten up the hook-screw holding the deflection yoke. When doing this, tighten up the hook-screw while pushing the yoke gently toward the screen side to prevent it from slipping off onto the socket of the tube.

4.2 Cleaning graticule plate

When the graticule plate becomes dirty, brightness of the tube is sharply reduced and the display becomes hard to see. It should be cleaned periodically.

(1) Removal

The graticule plate is held in at the four points indicated by

the arrows in Fig. 4.2.1. The plate is removed by pressing in and rotating it either right or left.

(2) Cleaning

The front and rear of the graticule plate, and the screen of the CRT should be cleaned using a clean, dry cloth. Do not use alcohol, tetrachlorides, acetone, or other organic solvents.

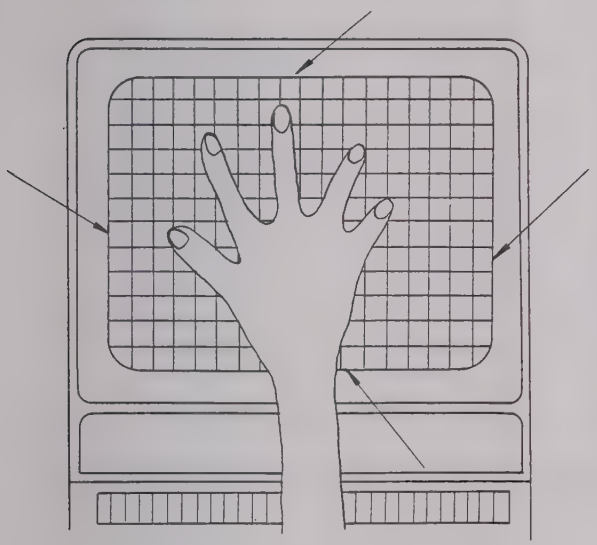


Fig. 4.2.1

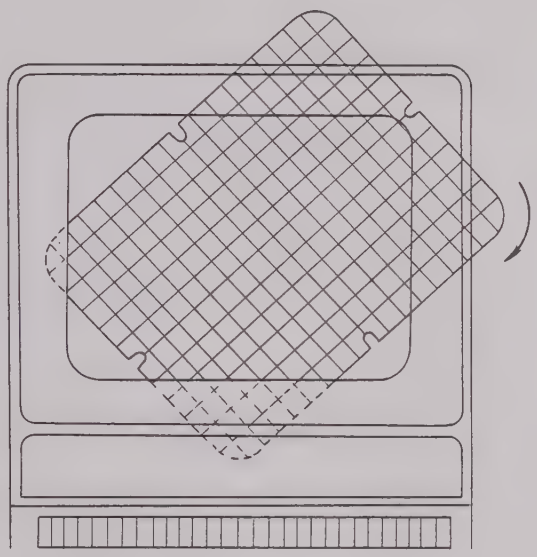


Fig. 4.2.2

(3) Installation

The corners of the plate should be slipped between the frame and the screen as shown in Fig. 4.2.2, and then rotated slowly in the direction of the arrow. The indentations cut into each edge of the plate will fit into projections behind the panel. When the plate is correctly installed, there should be very little movement in the plate. Check and make sure that the graticule plate fits in the frame.

4.3 Maintenance precautions

This section covers the procurement of parts, special precautions in replacing parts, and service.

4.3.1 Procurement of spare parts

The electrical components and the mechanical parts for the units of this series may be obtained from the dealer from whom this instrument is obtained.

4.3.2 Special precautions in replacing parts

As a rule, the manufacturer recommends that the unit be shipped to one of its service centers qualified to make repairs on the unit when it is in need of service. The owner choosing to replace parts himself should note the following items.

(1) The h_{fe} designation rank of the transistors.

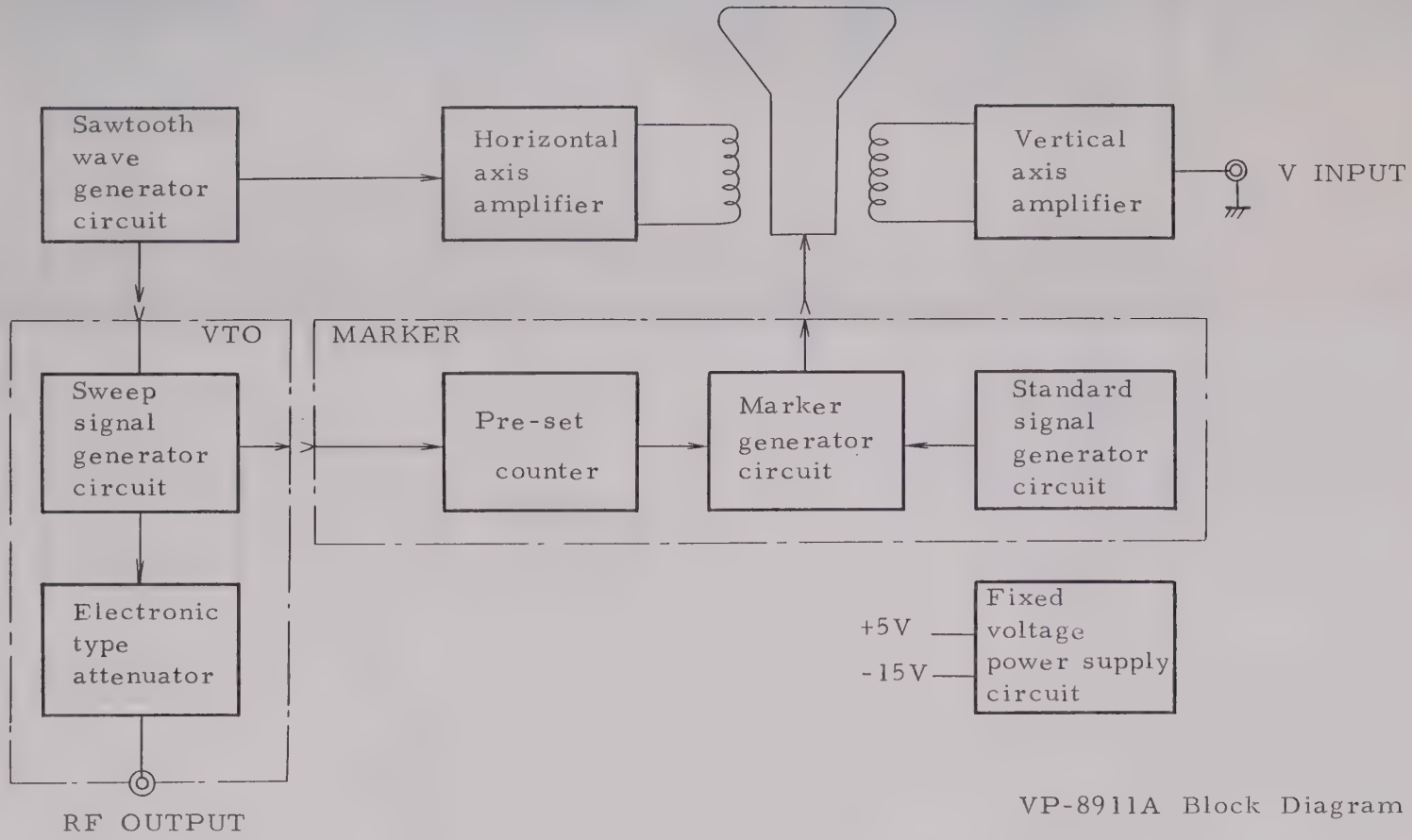
(2) The working voltage of the electrolytic capacitors.

(3) The wattage rating of the fixed resistors.

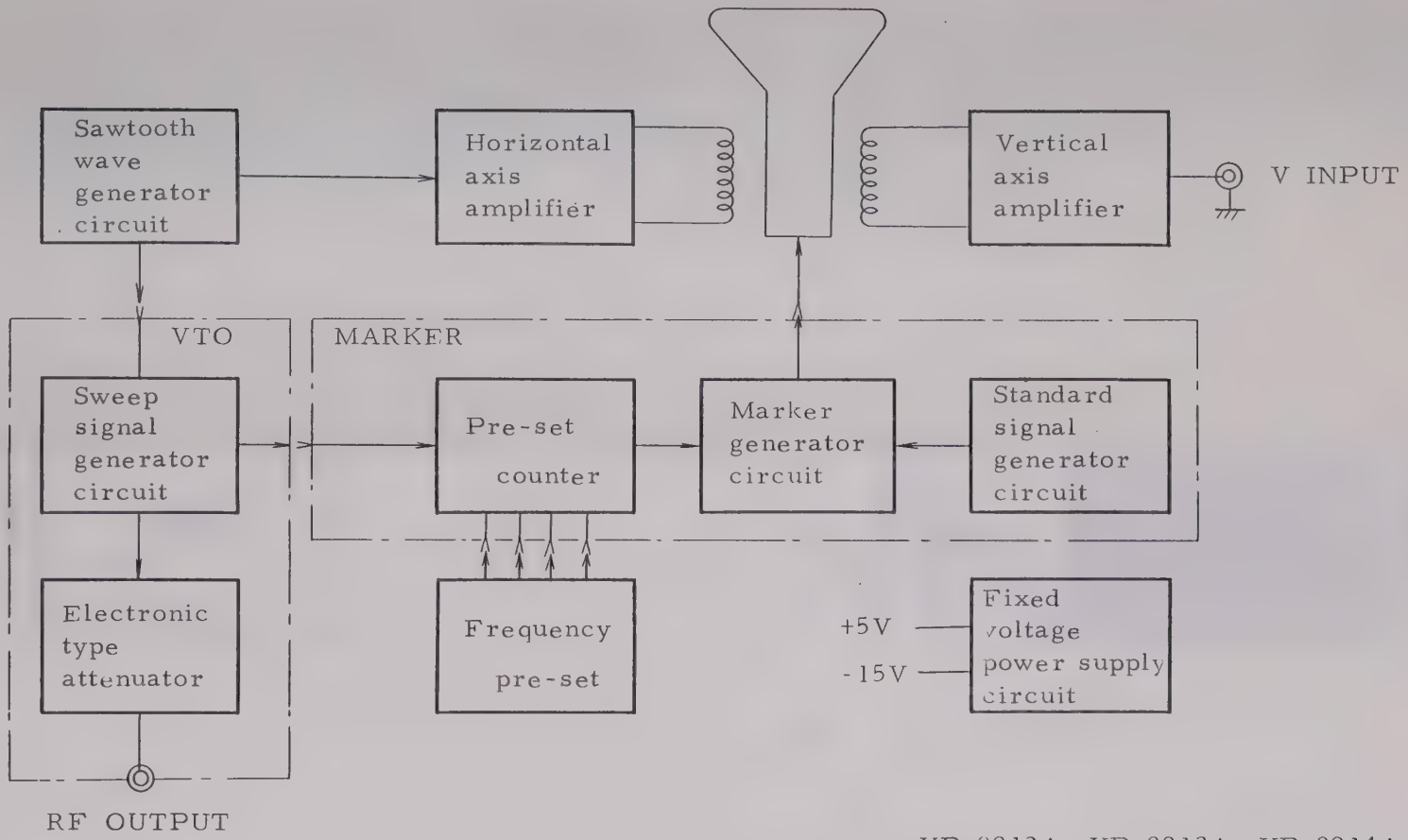
4.3.3 Communications with service center

When it becomes necessary to write to or otherwise contact one of the service centers concerning your unit, the following data should be included.

- Model (VP-8911A etc.)
- Serial number of the set (Label on rear panel)
- Symptoms

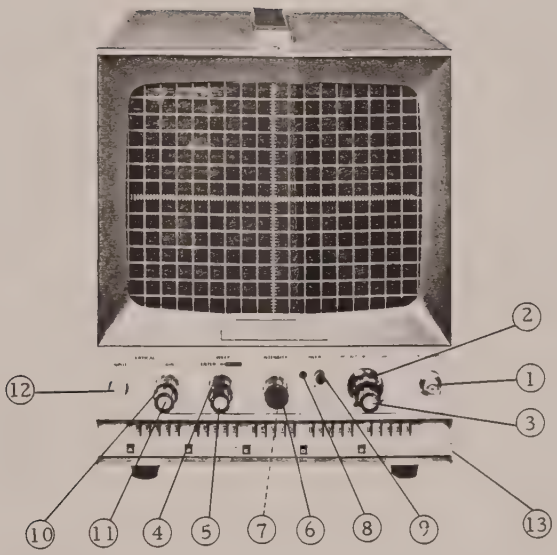


VP-8911A Block Diagram

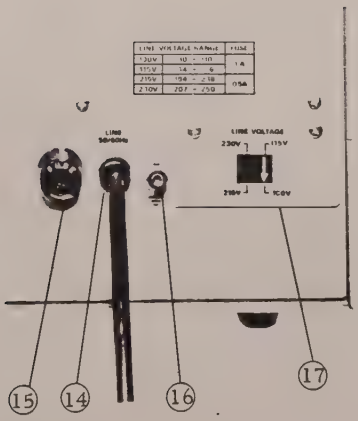


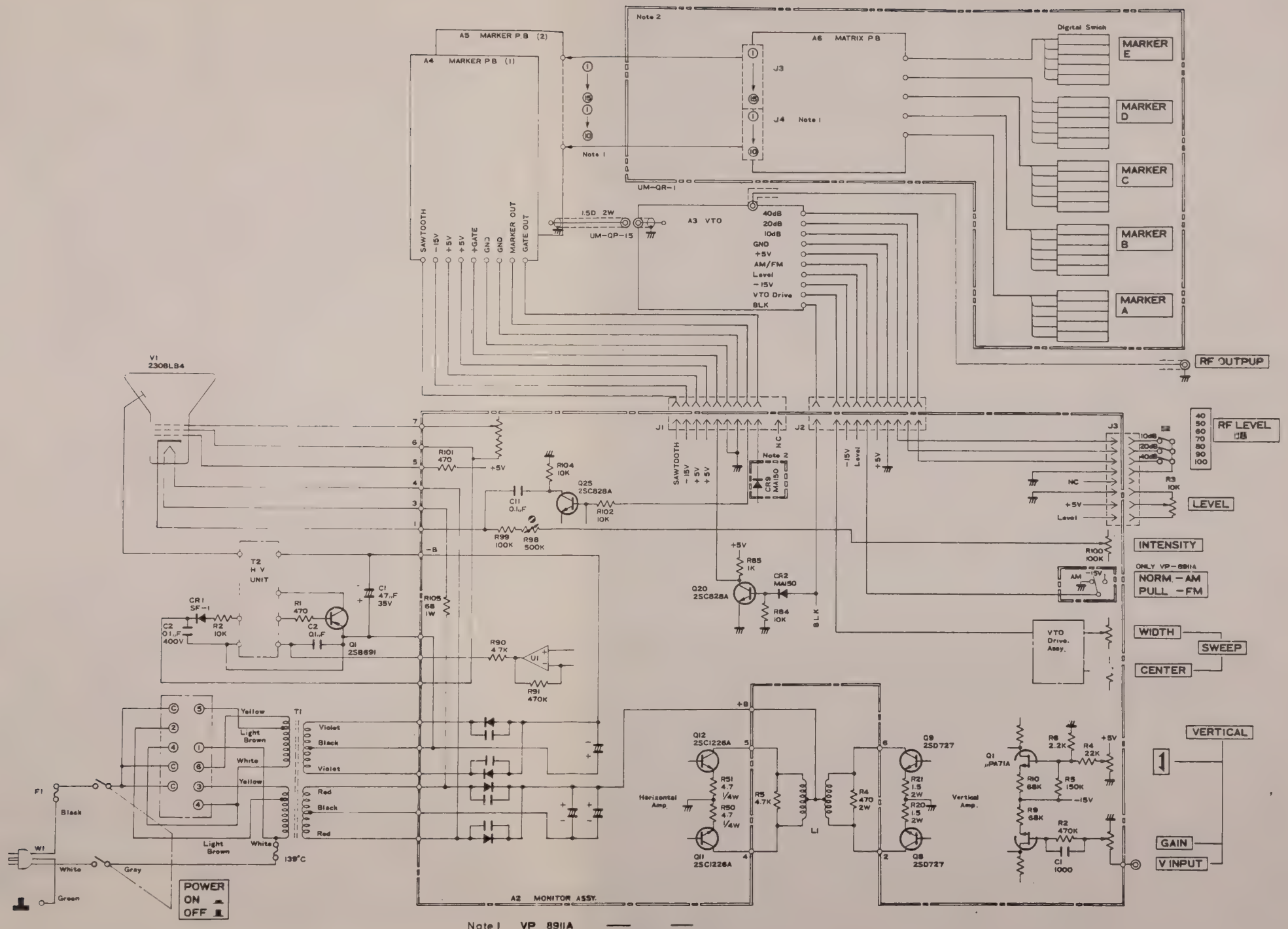
VP-8912A, VP 8913A, VP-8914A

Block Diagram



VP-8911A
ONLY

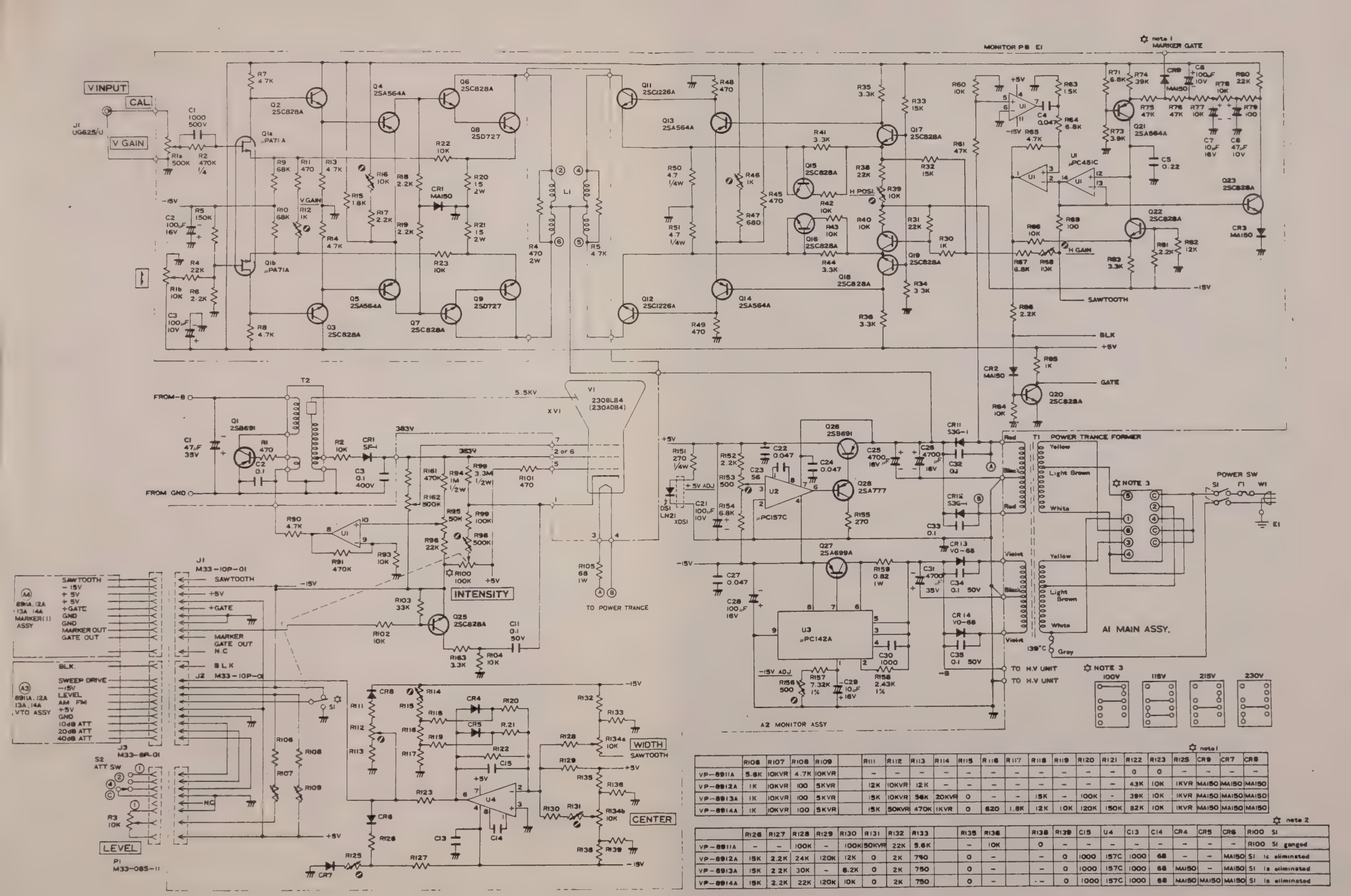




Note 1 VP 8911A ① to ⑤, ① to ⑦
VP-8912A ① to ⑤, ① to ⑨
VP 8913A ① to ⑤, ① to ⑨
VP-8914A ① to ⑤, ① to ⑨

Note 2 VP-8912A, 8913A, 8914A need within

VP-8911A to VP-8914A OVERALL INTERCONNECTION (A1) 1

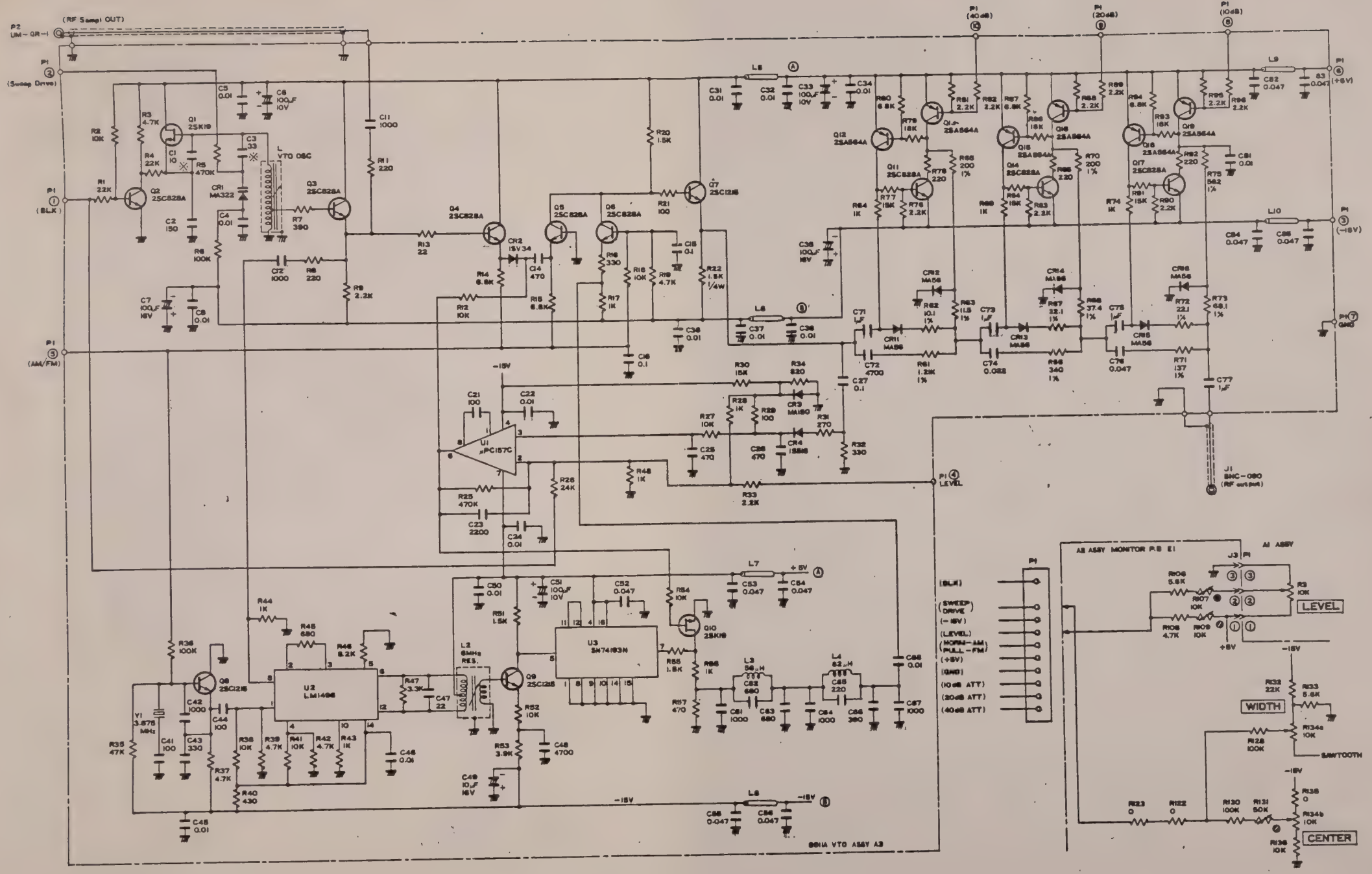


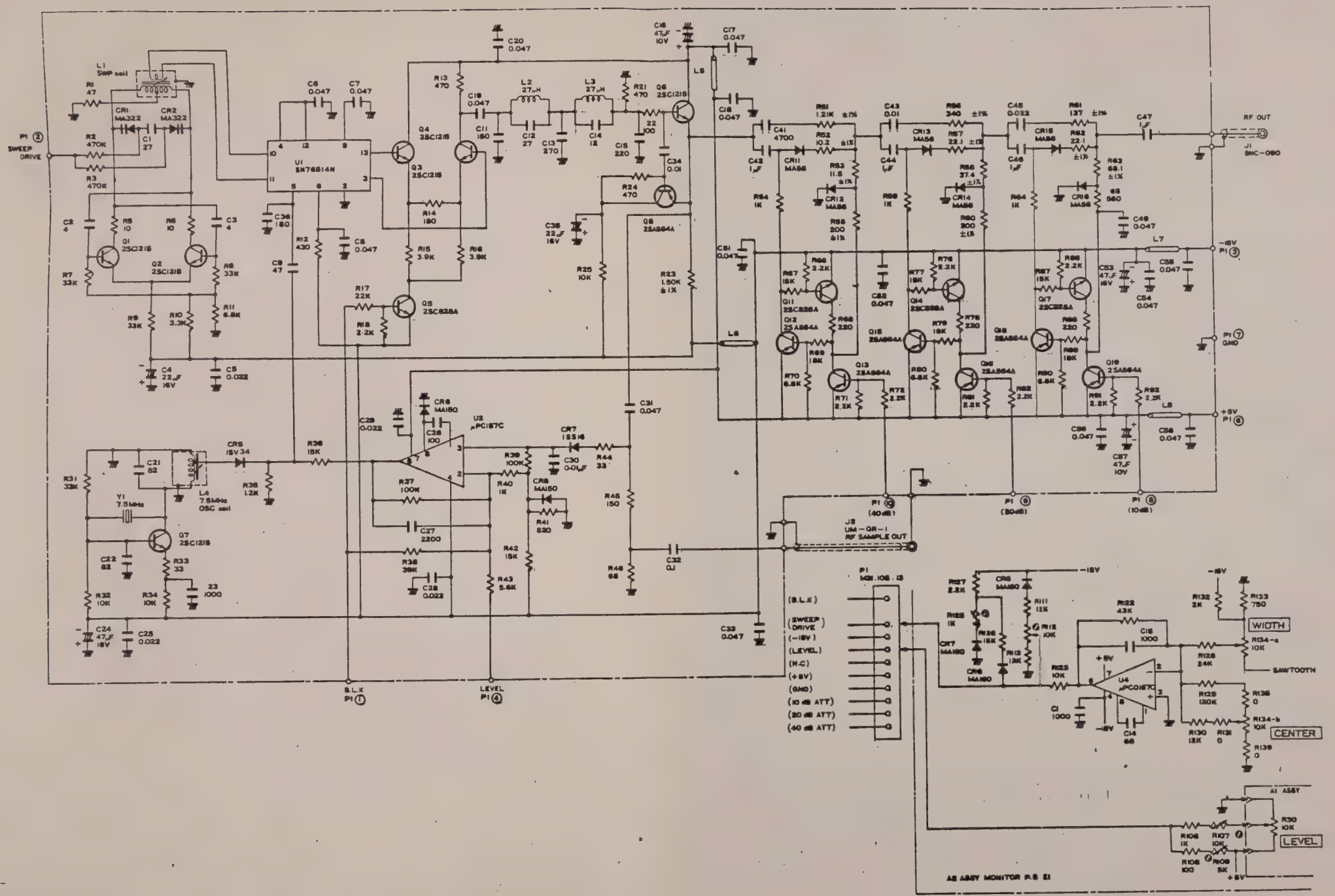
note 1

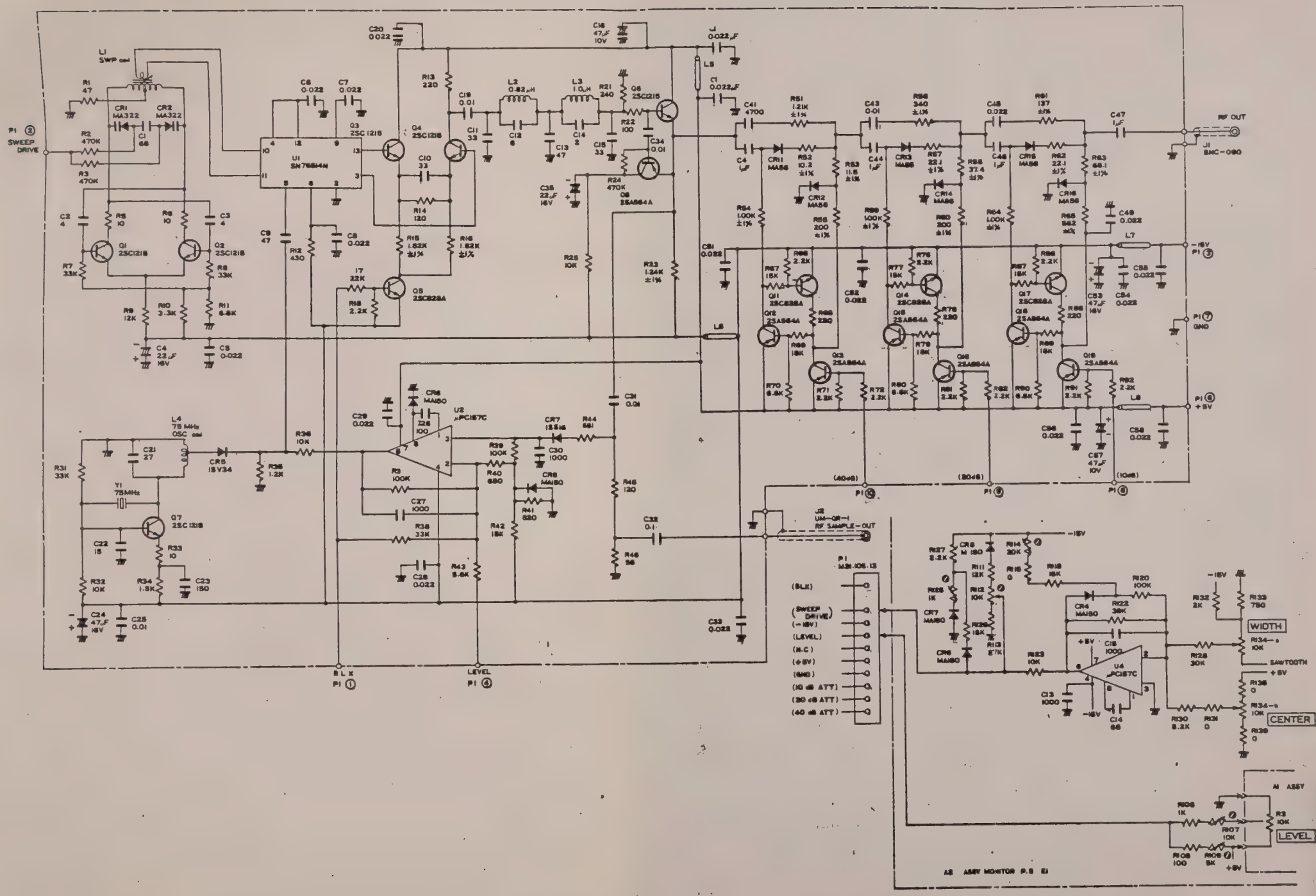
	R106	R107	R108	R109		R111	R112	R113	R114	R115	R116	R117	R118	R119	R120	R121	R122	R123	R125	CR9	CR7	CR8
VP-8911A	5.6K	10KVR	4.7K	10KVR		-	-	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-
VP-8912A	1K	10KVR	100	5KVR		12K	10KVR	12K	-	-	-	-	-	-	-	-	43K	10K	1KVR	MA150	MA150	MA150
VP-8913A	1K	10KVR	100	5KVR		15K	10KVR	56K	20KVR	0	-	-	15K	-	100K	-	39K	10K	1KVR	MA150	MA150	MA150
VP-8914A	1K	10KVR	100	5KVR		15K	50KVR	470K	1KVR	0	620	1.8K	12K	10K	120K	150K	82K	10K	1KVR	MA150	MA150	MA150

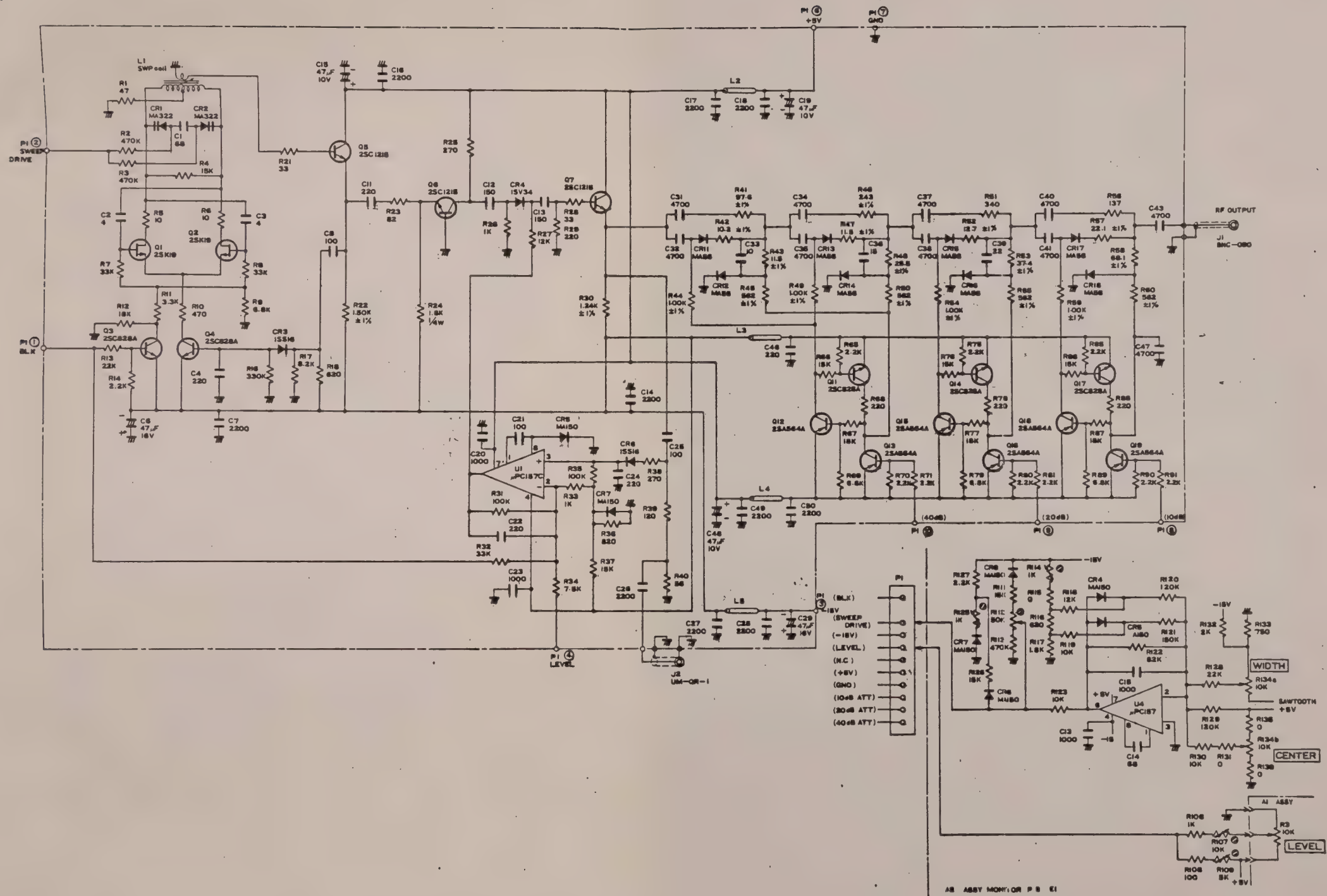
note 2

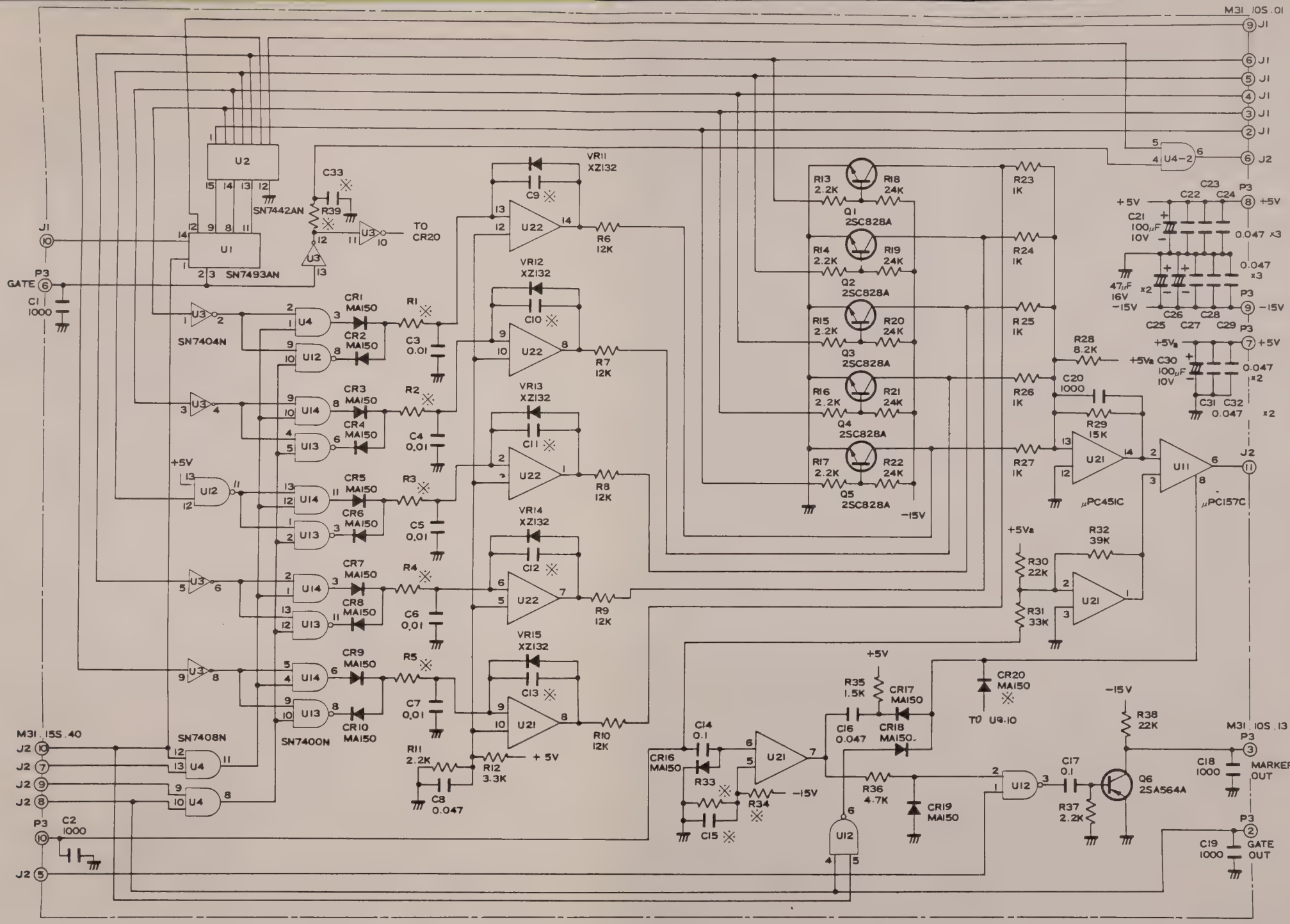
	R126	R127	R128	R129	R130	R131	R132	R133		R135	R136		R138	R139	C15	U4	C13	C14	CR4	CR5	CR6	R100 S1
VP-8911A	-	-	100K	-	100K	50KVR	22K	5.6K		-	10K		0	-	-	-	-	-	-	-	-	R100 S1 ganged
VP-8912A	15K	2.2K	24K	120K	12K	0	2K	790		0	-		-	0	1000	157C	1000	68	-	-	MA150	S1 is eliminated
VP-8913A	15K	2.2K	30K	-	8.2K	0	2K	750		0	-		-	0	1000	157C	1000	68	MA150	-	MA150	S1 is eliminated
VP-8914A	15K	2.2K	22K	120K	10K	0	2K	750		0	-		-	0	1000	157C	1000	68	MA150	MA150	MA150	S1 is eliminated


(RF Sampl OUT)
P2 UM-QR-I
P1 (Sweep Drive)
P1 (BLK)
P1 (AM/FM)
P1 (40dB)
P1 (20dB)
P1 (10dB)
P1 (+8V)
P1 (-15V)
P1 LEVEL
PK GND
J1 BNC-080 (RF output)
VTO OSC
U1 μPC157C
U2 LM1496
U3 SN74193N
L2 6MHz RES.
Y1 3.575 MHz
-15V
+5V
(BLK)
(SWEEP DRIVE)
(-15V)
(LEVEL)
(NORM-AM PULL-FM)
(+8V)
(GND)
(10dB ATT)
(20dB ATT)
(40dB ATT)
A8 ASSY MONITOR P.B E1
A1 ASSY
LEVEL
WIDTH
SAWTOOTH
CENTER
8911A VTO ASSY A3


SWEEP DRIVE
RF OUT
J1 BNC-080
-15V
+5V
GND
BLK
LEVEL
(BLK)
(SWEEP DRIVE)
(-15V)
(LEVEL)
(N.C)
(+5V)
(GND)
(10 dB ATT)
(20 dB ATT)
(40 dB ATT)
J3 UM-QR-1 RF SAMPLE OUT
WIDTH
SAWTOOTH
CENTER
LEVEL
A1 ASSY
A3 ASSY MONITOR P.S. E1

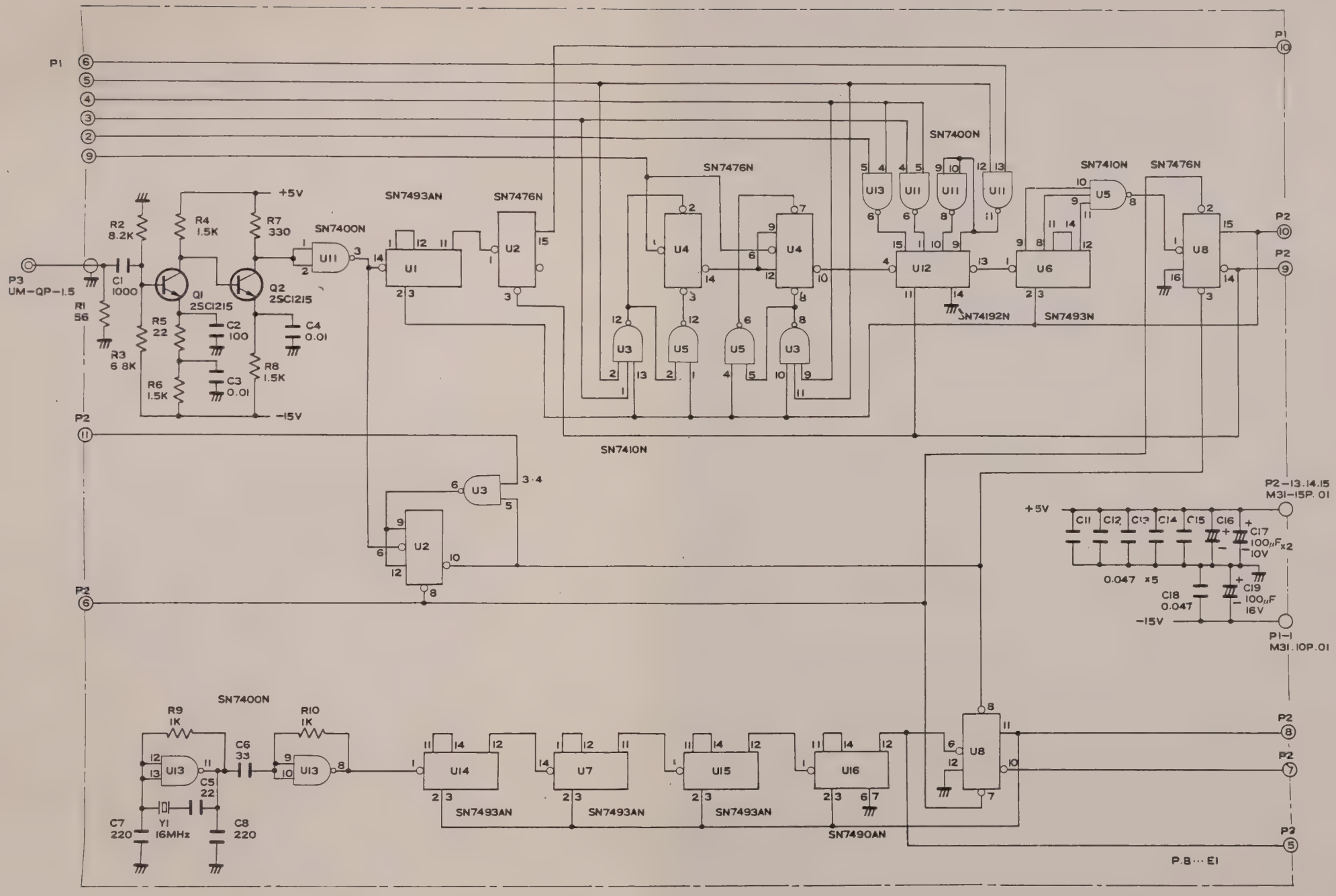

P1 ② SWEEP DRIVE
L1 SWP coil
R1 47
CR1 MA322
CR2 MA322
C1 68
R2 470K
R3 470K
U1 SN76644N
Q1 2SC1218
Q2 2SC1218
Q3 2SC1215
Q4 2SC1218
Q5 2SC828A
Q6 2SC1215
Q7 2SC1218
Q8 2SA864A
L2 0.82μH
L3 1.0μH
L4 75 MHz OSC coil
Y1 75MHz
U2 μPC157C
U3 μPC157C
CR5 1SV34
CR6 MA150
CR7 1SS16
CR8 MA150
J1 BNC-090
RF OUT
J2 UM-OR-I RF SAMPLE-OUT
L5
L6
L7
L8
-15V P1 ③
P1 ⑦ GND
+8V P1 ⑥
P1 ⑤ (40dB)
P1 ⑧ (80dB)
P1 ④ (100dB)
P1 M3-106-13
(BLK)
(SWEEP DRIVE)
(-15V)
(LEVEL)
(N.C.)
(+8V)
(GND)
(10 dB ATT)
(20 dB ATT)
(40 dB ATT)
BLK P1 ①
LEVEL P1 ④
WIDTH
SAWTOOTH
CENTER
LEVEL
A1 ASSY
A2 ASSY MONITOR P.S. ①


P1 ⑥ +8V
P1 ⑦ GND
P1 ② SWEEP DRIVE
P1 ① BLK
P1 ③ +15V
P1 ④ LEVEL
P1 ⑤ (40dB)
P1 ⑨ (20dB)
P1 ⑧ (10dB)
L1 SWP coil
L2
L3
L4
L5
Q1 2SK19
Q2 2SK19
Q3 2SC828A
Q4 2SC828A
Q5 2SC1218
Q6 2SC1218
Q7 2SC1218
Q11 2SC828A
Q14 2SC828A
Q17 2SC828A
Q12 2SA864A
Q15 2SA864A
Q18 2SA864A
Q13 2SA864A
Q16 2SA864A
Q19 2SA864A
U1 μPC187C
U4 μPC187
CR1 MA322
CR2 MA322
CR3 1SS16
CR4 1SV34
CR5 MA150
CR6 1SS16
CR7 MA150
CR8 MA150
CR9 MA150
CR10 MA856
CR11 MA856
CR12 MA856
CR13 MA856
CR14 MA856
CR15 MA856
CR16 MA856
CR17 MA856
CR18 MA856
J1 BNC-080
J2 UM-QR-1
RF OUTPUT
(BLK)
(SWEEP DRIVE)
(-15V)
(LEVEL)
(N.C.)
(+8V)
(GND)
(10dB ATT)
(20dB ATT)
(40dB ATT)
WIDTH
SAWTOOTH +8V
CENTER
LEVEL
A3 ASSY
A3 ASSY MONITOR P.B. E1

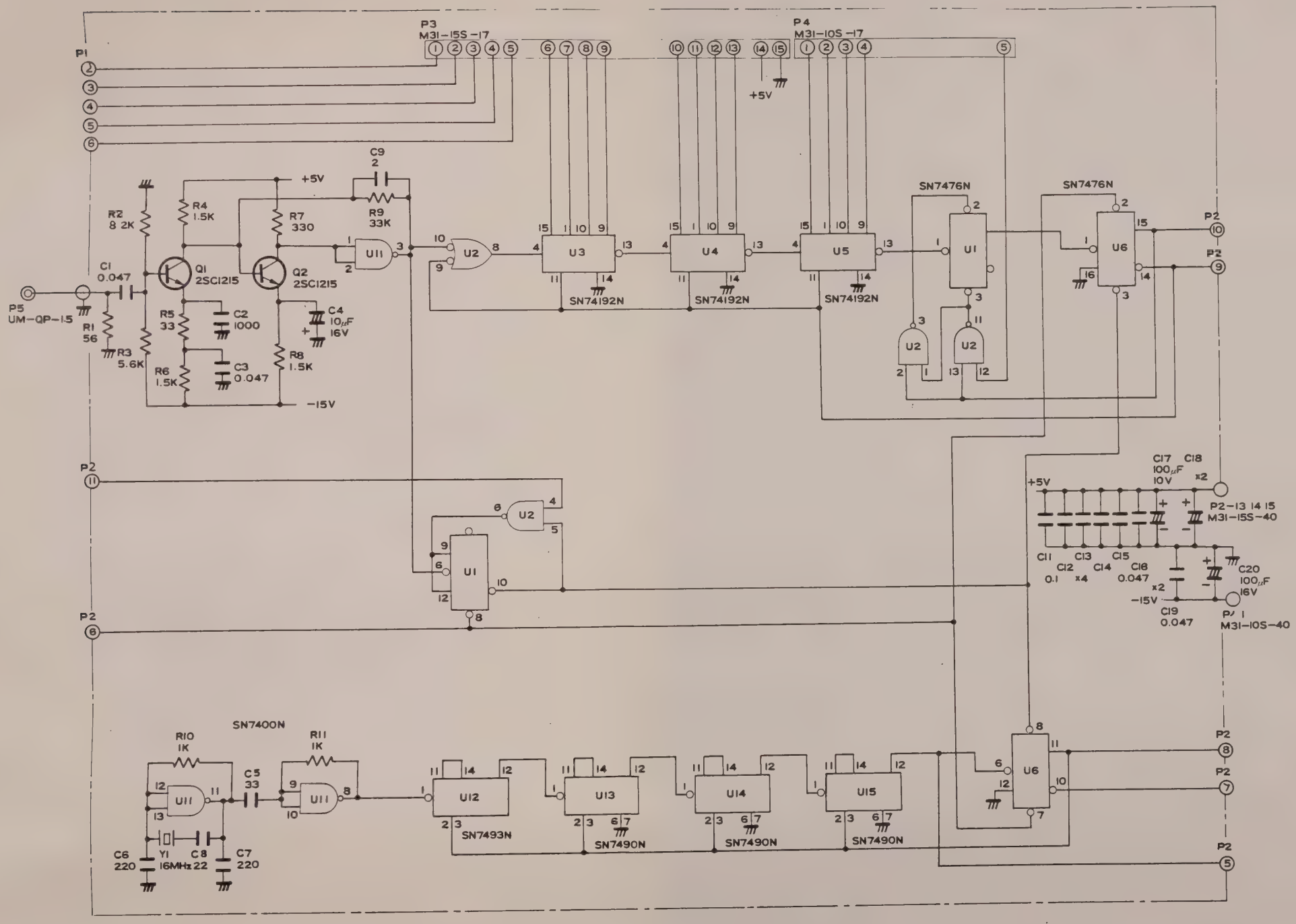


	C9	C10	C11	C12	C13	C15	C33	CR20	R1	R2	R3	R4	R5	R33	R34	R39
VP-8811A	0.47	0.47	0.47	0.47	0.47	0.047	—	—	22	22	22	22	22	820	22K	0
VP-8812A	4.7μF	4.7μF	4.7μF	4.7μF	4.7μF	—	—	—	100	100	100	100	100	0	—	0
VP-8813A	2.2μF	2.2μF	2.2μF	2.2μF	2.2μF	—	2200	MA150	100	100	100	100	100	0	—	0
VP-8814A	1μF	1μF	1μF	1μF	1μF	—	2200	MA150	47	47	47	47	47	0	—	0

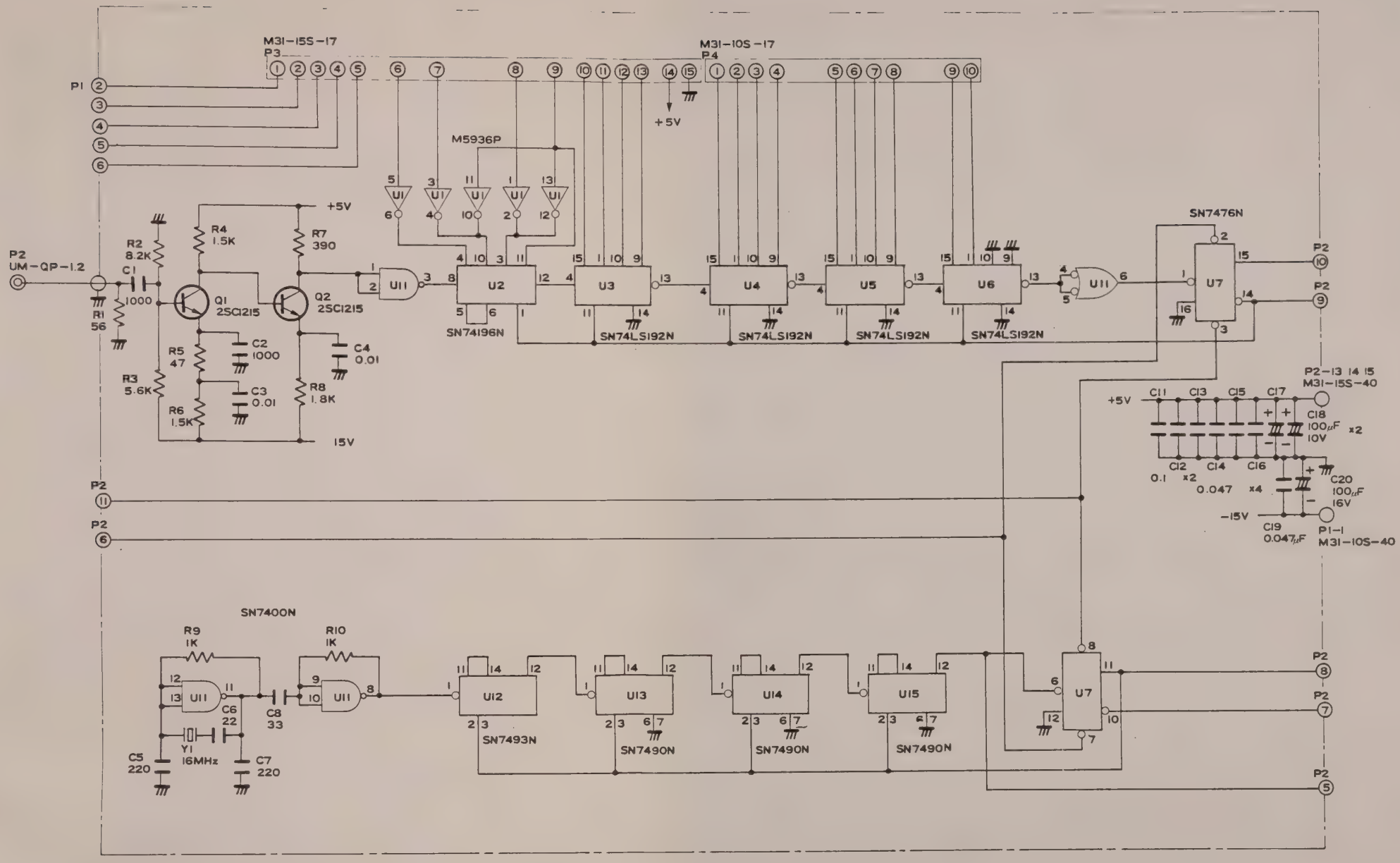
VP-8911A to VP-8914A MARKER (1)



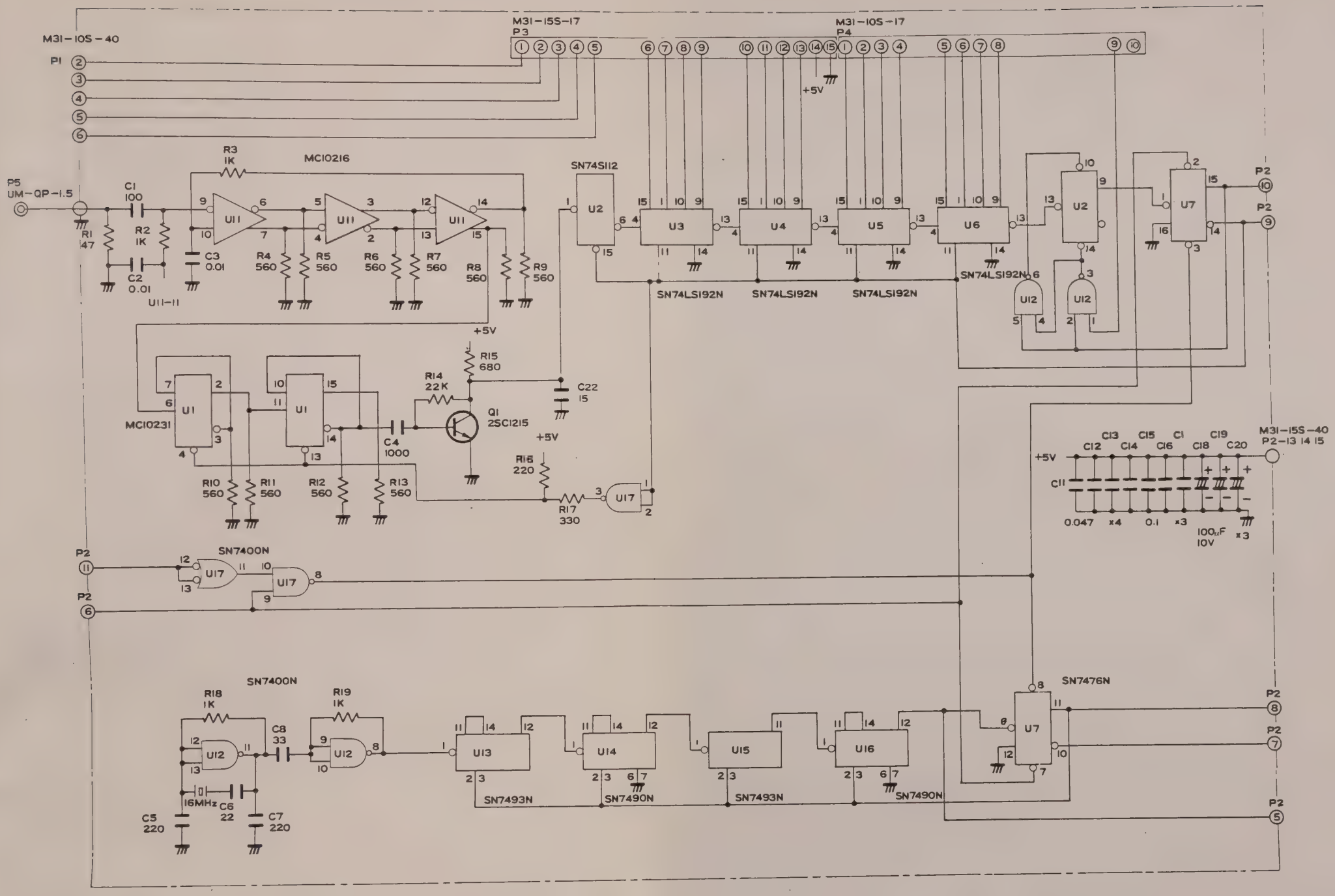
VP-8911A IF MARKER (2)



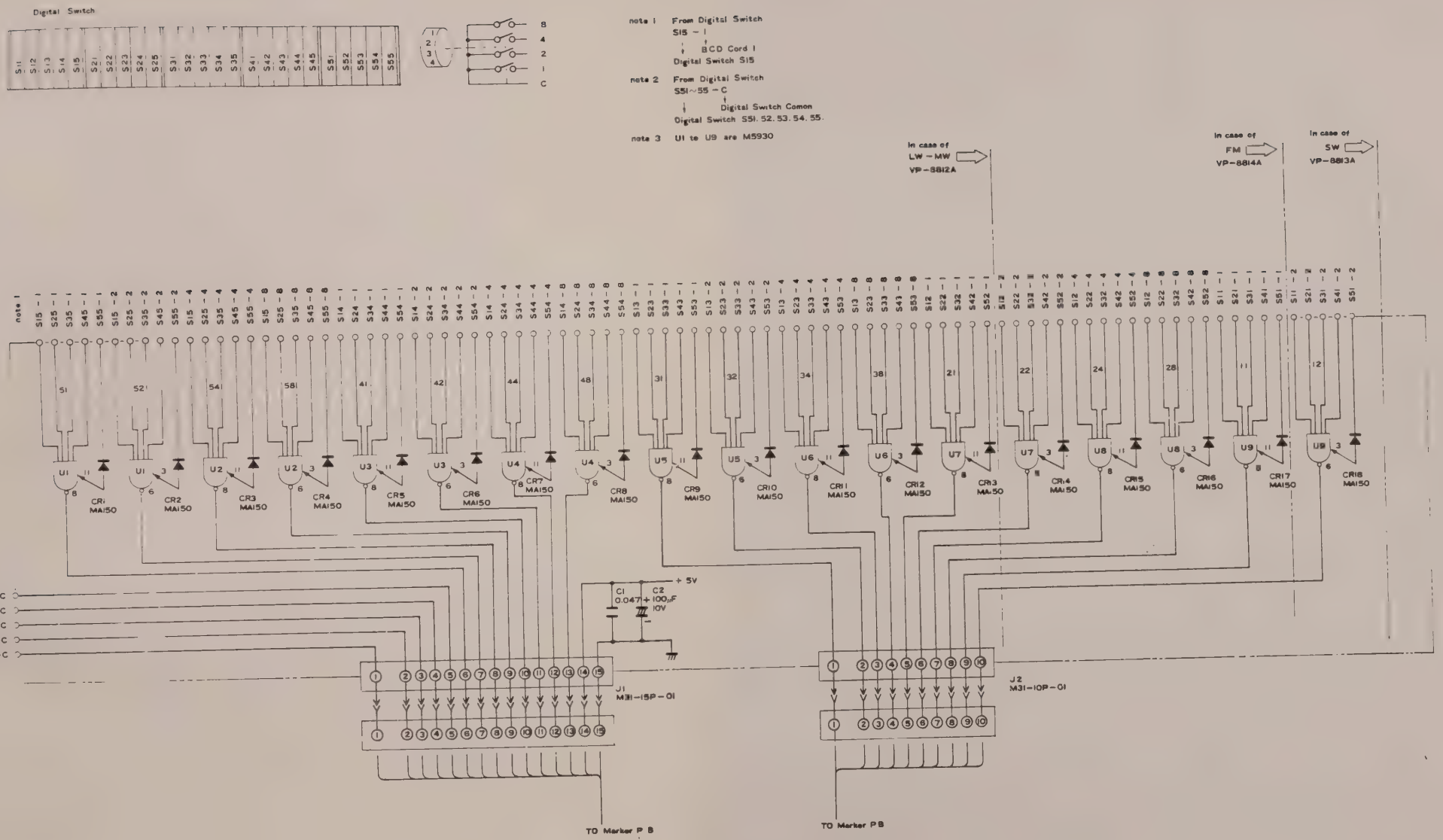
VP-8912A L W MARKER (2)



VP-8913A SW MARKER (2)



VP-8914A FM MARKER (2)



VP-8911A to VP-8914A MATRIX

PARTS LIST

.	4G202986	MKR-1-C	3-1
.	4G202987	MRK-1-E	3-3
.	4G202988	MRK-2	3-4
.	4G203005-1	OVERALL	3-6
.	4G203006-1	MONITOR	3-7
.	4G203007	VTO DRIVE	3-11
.	4G203008-1	VTO	3-12
.	4G301600	MECHA-E	3-16
.	4G302221	MECHA-C	3-17
.	4G301601	PACKAGE	3-17

MKR-1-C DWG NO 4G202986

REF	NO	QTY	PART NO	DESCRIPTION	
C	1	1	ECKW1H102KB5	C:FXD CER HI-K	1000PF +-10% 50V
C	2	1	ECKW1H102KB5	C:FXD CER HI-K	1000PF +-10% 50V
C	3	1	ECKW1H103ZF5	C:FXD CER HI-K	10000PF +80-20% 50V
C	4	1	ECKW1H103ZF5	C:FXD CER HI-K	10000PF +80-20% 50V
C	5	1	ECKW1H103ZF5	C:FXD CER HI-K	10000PF +80-20% 50V
C	6	1	ECKW1H103ZF5	C:FXD CER HI-K	10000PF +80-20% 50V
C	7	1	ECKW1H103ZF5	C:FXD CER HI-K	10000PF +80-20% 50V
C	8	1	ECKD1E473ZF2	C:FXD CER HI-K	47000PF +80-20% 25V
C	14	1	ECQM1H104KZ	C:FXD FLM	0.1UF 10% 50V
C	16	1	ECQM1H473KZ	C:FXD FLM	0.047UF 10% 50V
C	17	1	ECQM1H104KZ	C:FXD FLM	0.1UF 10% 50V
C	18	1	ECKW1H102KB5	C:FXD CER HI-K	1000PF +-10% 50V
C	19	1	ECKW1H102KB5	C:FXD CER HI-K	1000PF +-10% 50V
C	20	1	ECKW1H102KB5	C:FXD CER HI-K	1000PF +-10% 50V
C	21	1	ECEA1AS101	C:FXD AL ELECT	100UF +-20% 10V
C	22	1	ECKD1E473ZF2	C:FXD CER HI-K	47000PF +80-20% 25V
C	23	1	ECKD1E473ZF2	C:FXD CER HI-K	47000PF +80-20% 25V
C	24	1	ECKD1E473ZF2	C:FXD CER HI-K	47000PF +80-20% 25V
C	25	1	ECEA1CS101	C:FXD AL ELECT	100UF +-20% 16V
C	26	1	ECEA1CS101	C:FXD AL ELECT	100UF +-20% 16V
C	27	1	ECKD1E473ZF2	C:FXD CER HI-K	47000PF +80-20% 25V
C	28	1	ECKD1E473ZF2	C:FXD CER HI-K	47000PF +80-20% 25V
C	29	1	ECKD1E473ZF2	C:FXD CER HI-K	47000PF +80-20% 25V
C	30	1	ECEA1AS101	C:FXD AL ELECT	100UF +-20% 10V
C	31	1	ECKD1E473ZF2	C:FXD CER HI-K	47000PF +80-20% 25V
C	32	1	ECKD1E473ZF2	C:FXD CER HI-K	47000PF +80-20% 25V
CR	1	1	MA150TA	DIODE:SI	100MA 35V
CR	2	1	MA150TA	DIODE:SI	100MA 35V
CR	3	1	MA150TA	DIODE:SI	100MA 35V
CR	4	1	MA150TA	DIODE:SI	100MA 35V
CR	5	1	MA150TA	DIODE:SI	100MA 35V
CR	6	1	MA150TA	DIODE:SI	100MA 35V
CR	7	1	MA150TA	DIODE:SI	100MA 35V
CR	8	1	MA150TA	DIODE:SI	100MA 35V
CR	9	1	MA150TA	DIODE:SI	100MA 35V
CR	10	1	MA150TA	DIODE:SI	100MA 35V
CR	16	1	MA150TA	DIODE:SI	100MA 35V
CR	17	1	MA150TA	DIODE:SI	100MA 35V
CR	18	1	MA150TA	DIODE:SI	100MA 35V
CR	19	1	MA150TA	DIODE:SI	100MA 35V
E	1	1	3G400854	P8911A PC BOARD	MARKER (1)
J	1	1	M3110S40	CONNECTOR:PIN	10P
J	2	1	M3115S40	CONNECTOR:PIN	15P

MKR-1-C DWG NO 4G202986

REF	NO	QTY	PART NO	DESCRIPTION	
P	3	1	M3110S13	CONNECTOR:PIN	10P L:300
Q	1	1	2SC828A-RS	TSTR:SI NPN	PC:250MW FT:220MHZ
Q	2	1	2SC828A-RS	TSTR:SI NPN	PC:250MW FT:220MHZ
Q	3	1	2SC828A-RS	TSTR:SI NPN	PC:250MW FT:220MHZ
Q	4	1	2SC828A-RS	TSTR:SI NPN	PC:250MW FT:220MHZ
Q	5	1	2SC828A-RS	TSTR:SI NPN	PC:250MW FT:220MHZ
Q	6	1	2SA564A-RS	TSTR:SI PNP	PC:250MW FT:80MHZ
R	6	1	ERD25TJ123V	R:FXD CARBON	12K OHM 5% 1/4W
R	7	1	ERD25TJ123V	R:FXD CARBON	12K OHM 5% 1/4W
R	8	1	ERD25TJ123V	R:FXD CARBON	12K OHM 5% 1/4W
R	9	1	ERD25TJ123V	R:FXD CARBON	12K OHM 5% 1/4W
R	10	1	ERD25TJ123V	R:FXD CARBON	12K OHM 5% 1/4W
R	11	1	ERD25TJ222V	R:FXD CARBON	2.2K OHM 5% 1/4W
R	12	1	ERD25TJ332V	R:FXD CARBON	3.3K OHM 5% 1/4W
R	13	1	ERD25TJ222V	R:FXD CARBON	2.2K OHM 5% 1/4W
R	14	1	ERD25TJ222V	R:FXD CARBON	2.2K OHM 5% 1/4W
R	15	1	ERD25TJ222V	R:FXD CARBON	2.2K OHM 5% 1/4W
R	16	1	ERD25TJ222V	R:FXD CARBON	2.2K OHM 5% 1/4W
R	17	1	ERD25TJ222V	R:FXD CARBON	2.2K OHM 5% 1/4W
R	18	1	ERD25TJ243V	R:FXD CARBON	24K OHM 5% 1/4W
R	19	1	ERD25TJ243V	R:FXD CARBON	24K OHM 5% 1/4W
R	20	1	ERD25TJ243V	R:FXD CARBON	24K OHM 5% 1/4W
R	21	1	ERD25TJ243V	R:FXD CARBON	24K OHM 5% 1/4W
R	22	1	ERD25TJ243V	R:FXD CARBON	24K OHM 5% 1/4W
R	23	1	ERD25TJ102V	R:FXD CARBON	1K OHM 5% 1/4W
R	24	1	ERD25TJ102V	R:FXD CARBON	1K OHM 5% 1/4W
R	25	1	ERD25TJ102V	R:FXD CARBON	1K OHM 5% 1/4W
R	26	1	ERD25TJ102V	R:FXD CARBON	1K OHM 5% 1/4W
R	27	1	ERD25TJ102V	R:FXD CARBON	1K OHM 5% 1/4W
R	28	1	ERD25TJ822V	R:FXD CARBON	8.2K OHM 5% 1/4W
R	29	1	ERD25TJ153V	R:FXD CARBON	15K OHM 5% 1/4W
R	30	1	ERD25TJ223V	R:FXD CARBON	22K OHM 5% 1/4W
R	31	1	ERD25TJ333V	R:FXD CARBON	33K OHM 5% 1/4W
R	32	1	ERD25TJ393V	R:FXD CARBON	39K OHM 5% 1/4W
R	35	1	ERD25TJ152V	R:FXD CARBON	1.5K OHM 5% 1/4W
R	36	1	ERD25TJ472V	R:FXD CARBON	4.7K OHM 5% 1/4W
R	37	1	ERD25TJ222V	R:FXD CARBON	2.2K OHM 5% 1/4W
R	38	1	ERD25TJ223V	R:FXD CARBON	22K OHM 5% 1/4W
R	50	1	ERD25TJ103V	R:FXD CARBON	10K OHM 5% 1/4W

MKR-1-C DWG NO 4G202986

REF NO	QTY	PART NO	DESCRIPTION	
U 1	1	SN7493AN	IC:TTL	4-BIT BINARY COUNTER
U 2	1	SN7442AN	IC:TTL	BCD-DECIMAL DECODER
U 3	1	SN7404N	IC:TTL	HEX INVERTER
U 4	1	SN7408N	IC:TTL	QUAD 2-INPUT AND GATE
U 11	1	UPC157C	IC:OP AMP	
U 12	1	SN7400N	IC:TTL	QUAD 2-INPUT NAND GATE
U 13	1	SN7400N	IC:TTL	QUAD 2-INPUT NAND GATE
U 14	1	SN7408N	IC:TTL	QUAD 2-INPUT AND GATE
U 21	1	UPC451C	IC:OP AMP	QUAD
U 22	1	UPC451C	IC:OP AMP	QUAD
VR 11	1	RD13EB3	DIODE:ZENER	13.2V 500MW
VR 12	1	RD13EB3	DIODE:ZENER	13.2V 500MW
VR 13	1	RD13EB3	DIODE:ZENER	13.2V 500MW
VR 14	1	RD13EB3	DIODE:ZENER	13.2V 500MW
VR 15	1	RD13EB3	DIODE:ZENER	13.2V 500MW

MRK-1-E DWG NO 4G202987

REF NO	QTY	PART NO	DESCRIPTION	
C 9	1	ECSF35ER47G	C:FXD TA ELECT	0.47UF +-20% 35V
C 10	1	ECSF35ER47G	C:FXD TA ELECT	0.47UF +-20% 35V
C 11	1	ECSF35ER47G	C:FXD TA ELECT	0.47UF +-20% 35V
C 12	1	ECSF35ER47G	C:FXD TA ELECT	0.47UF +-20% 35V
C 13	1	ECSF35ER47G	C:FXD TA ELECT	0.47UF +-20% 35V
C 15	1	ECKD1E473ZF2	C:FXD CER HI-K	47000PF +80-20% 25V
R 1	1	ERD25TJ220V	R:FXD CARBON	22 OHM 5% 1/4W
R 2	1	ERD25TJ220V	R:FXD CARBON	22 OHM 5% 1/4W
R 3	1	ERD25TJ220V	R:FXD CARBON	22 OHM 5% 1/4W
R 4	1	ERD25TJ220V	R:FXD CARBON	22 OHM 5% 1/4W
R 5	1	ERD25TJ220V	R:FXD CARBON	22 OHM 5% 1/4W
R 33	1	ERD25TJ821V	R:FXD CARBON	820 OHM 5% 1/4W
R 34	1	ERD25TJ223V	R:FXD CARBON	22K OHM 5% 1/4W

MRK-2 DWG NO 4G202988

REF	NO	QTY	PART NO	DESCRIPTION	
C	1	1	ECKW1H102KB5	C:FXD CER HI-K	1000PF +-10% 50V
C	2	1	ECCW1H101KC5	C:FXD CER TC	100PF +-10% 50V NPO
C	3	1	ECKW1H103ZF5	C:FXD CER HI-K	10000PF +80-20% 50V
C	4	1	ECKW1H103ZF5	C:FXD CER HI-K	10000PF +80-20% 50V
C	5	1	ECCW1H220KC5	C:FXD CER TC	22PF +-10% 50V NPO
C	6	1	ECCW1H330KC5	C:FXD CER TC	33PF +-10% 50V NPO
C	7	1	ECKW1H221KB5	C:FXD CER HI-K	220PF +-10% 50V
C	8	1	ECKW1H221KB5	C:FXD CER HI-K	220PF +-10% 50V
C	11	1	ECKD1E473ZF2	C:FXD CER HI-K	47000PF +80-20% 25V
C	12	1	ECKD1E473ZF2	C:FXD CER HI-K	47000PF +80-20% 25V
C	13	1	ECKD1E473ZF2	C:FXD CER HI-K	47000PF +80-20% 25V
C	14	1	ECKD1E473ZF2	C:FXD CER HI-K	47000PF +80-20% 25V
C	15	1	ECKD1E473ZF2	C:FXD CER HI-K	47000PF +80-20% 25V
C	16	1	ECEB1AS101	C:FXD AL ELECT	100UF +-20% 10V
C	17	1	ECEB1AS101	C:FXD AL ELECT	100UF +-20% 10V
C	18	1	ECKD1E473ZF2	C:FXD CER HI-K	47000PF +80-20% 25V
C	19	1	ECEB1CS101	C:FXD AL ELECT	100UF +-20% 16V
E	1	1	3G400853	P8911A PC BOARD	MARKER (2)
P	1	1	M3310P01	CONNECTOR:PIN	10P STRAIGHT
P	2	1	M3115P01	CONNECTOR:PIN	15P
P	3	1	UMQP1-5	CONNECTOR:COAX	PLUG
Q	1	1	2SC1215	TSTR:SI NPN	PC:200MW FT:1200MHZ
Q	2	1	2SC1215	TSTR:SI NPN	PC:200MW FT:1200MHZ
R	1	1	ERD25TJ560V	R:FXD CARBON	56 OHM 5% 1/4W
R	2	1	ERD25TJ822V	R:FXD CARBON	8.2K OHM 5% 1/4W
R	3	1	ERD25TJ682V	R:FXD CARBON	6.8K OHM 5% 1/4W
R	4	1	ERD25TJ152V	R:FXD CARBON	1.5K OHM 5% 1/4W
R	5	1	ERD25TJ220V	R:FXD CARBON	22 OHM 5% 1/4W
R	6	1	ERD25TJ152V	R:FXD CARBON	1.5K OHM 5% 1/4W
R	7	1	ERD25TJ331V	R:FXD CARBON	330 OHM 5% 1/4W
R	8	1	ERD25TJ152V	R:FXD CARBON	1.5K OHM 5% 1/4W
R	9	1	ERD25TJ102V	R:FXD CARBON	1K OHM 5% 1/4W
R	10	1	ERD25TJ102V	R:FXD CARBON	1K OHM 5% 1/4W
U	1	1	SN7493AN	IC:TTL	4-BIT BINARY COUNTER
U	2	1	SN7476N	IC:TTL	DUAL J-K FLIP-FLOP
U	3	1	SN7410N	IC:TTL	TRIPLE 3-INPUT NAND GATE
U	4	1	SN7476N	IC:TTL	DUAL J-K FLIP-FLOP
U	5	1	SN7410N	IC:TTL	TRIPLE 3-INPUT NAND GATE
U	6	1	SN7493AN	IC:TTL	4-BIT BINARY COUNTER
U	7	1	SN7493AN	IC:TTL	4-BIT BINARY COUNTER
U	8	1	SN7476N	IC:TTL	DUAL J-K FLIP-FLOP
U	11	1	SN7400N	IC:TTL	QUAD 2-INPUT NAND GATE
U	12	1	SN74192N	IC:TTL	REVERS DECADE COUNTER

MRK-2 DWG NO 4G202988

REF NO	QTY	PART NO	DESCRIPTION	
U 13	1	SN7400N	IC:TTL	QUAD 2-INPUT NAND GATE
U 14	1	SN7493AN	IC:TTL	4-BIT BINARY COUNTER
U 15	1	SN7493AN	IC:TTL	4-BIT BINARY COUNTER
U 16	1	SN7490AN	IC:TTL	DECADE COUNTER
Y 1	1	78A21	CRYSTAL:QUARTZ OSC	16MHZ (HC-18/U)

REF NO	QTY	PART NO	DESCRIPTION	
		OVERALL	DWG NO 4G203005-1	
	1	78W05	P8920B CABLE ASSY	
	1	78W06	P8915J CABLE ASSY	
C 1	1	ECEB1VS470	C:FXD AL ELECT	47UF +-20% 35V
C 2	1	ECKD1E104ZFZ	C:FXD CER HI-K	100000PF +80-20% 25V
C 3	1	ECQM4104MZ	C:FXD FLM	0.1UF 20% 400V
CR 1	1	SF1	DIODE:SWITCHING	300MA 1500V
E 1	1	4G644260-0GB	TERMINAL:PROTECTIV EARTH	
E 2	1	CM2	CONNECTOR	POWER AC125V 15A
F **	1	TSC1A	FUSE	1A 250V 20MM
F 1	1	TSC1A	FUSE	1A 250V 20MM
J 1	1	UG625UNI	CONNECTOR:COAX	BNC PANEL JACK
L 1	1	0L002	COIL:FXD	
P 1	1	M3308S11	CONNECTOR:PIN	8P L:100
Q 1	1	2SB691-PQ	TSTR:GE PNP	PC:600MW FT:7MHZ
R 1	1	ERD25TJ681V	R:FXD CARBON	680 OHM 5% 1/4W
R 2	1	ERD25TJ103V	R:FXD CARBON	10K OHM 5% 1/4W
R 3	1	EVHZ03Z06B14	R:VAR CARBON	10K OHM 20% 1/5W
R 4	1	ERG2ANJ471	R:FXD MET OXD	470 OHM 5% 2W
R 5	1	ERD25TJ472V	R:FXD CARBON	4.7K OHM 5% 1/4W
S 1	1	ESB701T	PUSHB SW	DPDT 3A-250V AC
S 2	1	4G410473	P8811A ROTARY SW	ATT
T 1	1	3G430386-1	P8911A TRANSFORMER	PWR
T 2	1	74T004	P8920B TRANSFORMER	HV
V 1	1	230BLB4	CRT	9-INCH
W 1	1	77W02	CABLE:PWR (UL,CSA)	125V 10A
XF 1	1	SN2250	FUSE HOLDER	10A 250V
XV 1	1	TV801	CRT SOCKET	

MONITOR DWG NO 4G203006-1

REF NO	QTY	PART NO	DESCRIPTION	
C 1	1	ECKW2H102MD	C:FXD CER HI-K	1000PF +-20% 500V
C 2	1	ECEA1CS101	C:FXD AL ELECT	100UF +-20% 16V
C 3	1	ECEA1AS101	C:FXD AL ELECT	100UF +-20% 10V
C 4	1	ECQM1H223KZ	C:FXD FLM	0.022UF 10% 50V
C 5	1	ECQM1H224KZ	C:FXD FLM	0.22UF 10% 50V
C 6	1	ECEA1AS101	C:FXD AL ELECT	100UF +-20% 10V
C 7	1	ECEA1CS100	C:FXD AL ELECT	10UF +-20% 16V
C 8	1	ECEA1AS470	C:FXD AL ELECT	47UF +-20% 10V
C 11	1	77C08	C:FXD CER TC	100000PF +80% -20% 50V
C 21	1	ECEA1AS101	C:FXD AL ELECT	100UF +-20% 10V
C 22	1	ECKD1E473ZF2	C:FXD CER HI-K	47000PF +80-20% 25V
C 23	1	ECCW1H560KC5	C:FXD CER TC	56PF +-10% 50V NPO
C 24	1	ECKD1E473ZF2	C:FXD CER HI-K	47000PF +80-20% 25V
C 25	1	ECET16R472SW	C:FXD AL ELECT	4700UF +30%-10% 16V
C 26	1	ECET16R472SW	C:FXD AL ELECT	4700UF +30%-10% 16V
C 27	1	ECKD1E473ZF2	C:FXD CER HI-K	47000PF +80-20% 25V
C 28	1	ECEA1CS101	C:FXD AL ELECT	100UF +-20% 16V
C 29	1	ECEA1CS100	C:FXD AL ELECT	10UF +-20% 16V
C 30	1	ECKW1H102KB5	C:FXD CER HI-K	1000PF +-10% 50V
C 31	1	ECET35R472SW	C:FXD AL ELECT	4700UF +30%-10% 35V
C 32	1	ECKD1E104ZFZ	C:FXD CER HI-K	100000PF +80-20% 25V
C 33	1	ECKD1E104ZFZ	C:FXD CER HI-K	100000PF +80-20% 25V
C 34	1	77C08	C:FXD CER TC	100000PF +80% -20% 50V
C 35	1	77C08	C:FXD CER TC	100000PF +80% -20% 50V
C 51	1	ECKF1H104ZV	C:FXD CER HI-K	0.1UF +80%-20% 50V
C 52	1	ECKF1H104ZV	C:FXD CER HI-K	0.1UF +80%-20% 50V
C 55	1	ECKF1H103ZF	C:FXD CER HI-K	10000PF +80-20% 50V
CR 1	1	MA150TA	DIODE:SI	100MA 35V
CR 2	1	MA150TA	DIODE:SI	100MA 35V
CR 3	1	MA150TA	DIODE:SI	100MA 35V
CR 11	1	S3V10	DIODE:PWR RECT	3.5A 100V
CR 12	1	S3V10	DIODE:PWR RECT	3.5A 100V
CR 13	1	V06B	DIODE:SI	1.3A 600V
CR 14	1	V06B	DIODE:SI	1.3A 600V
DS 1	1	LN21	LED	RED
E 1	1	2G400543	P8911A PC BOARD	MONITOR
J 1	1	M3310P01	CONNECTOR:PIN	10P STRAIGHT
J 2	1	M3310P01	CONNECTOR:PIN	10P STRAIGHT
J 3	1	M3308P01	CONNECTOR:PIN	8P STRAIGHT

MONITOR DWG NO 4G203006-1

REF	NO	QTY	PART NO	DESCRIPTION	
Q	1	1	UPA71AM	TSTR:FET	PC:250MW
Q	2	1	2SC828A-RS	TSTR:SI NPN	PC:250MW FT:220MHZ
Q	3	1	2SC828A-RS	TSTR:SI NPN	PC:250MW FT:220MHZ
Q	4	1	2SA564A-RS	TSTR:SI PNP	PC:250MW FT:80MHZ
Q	5	1	2SA564A-RS	TSTR:SI PNP	PC:250MW FT:80MHZ
Q	6	1	2SC828A-RS	TSTR:SI NPN	PC:250MW FT:220MHZ
Q	7	1	2SC828A-RS	TSTR:SI NPN	PC:250MW FT:220MHZ
Q	8	1	2SD727-PQ	TSTR:SI NPN	PC:600MW FT:200MHZ
Q	9	1	2SD727-PQ	TSTR:SI NPN	PC:600MW FT:200MHZ
Q	11	1	2SC1226A-QR	TSTR:SI NPN	PC:10W FT:150MHZ
Q	12	1	2SC1226A-QR	TSTR:SI NPN	PC:10W FT:150MHZ
Q	13	1	2SA564A-RS	TSTR:SI PNP	PC:250MW FT:80MHZ
Q	14	1	2SA564A-RS	TSTR:SI PNP	PC:250MW FT:80MHZ
Q	15	1	2SC828A-RS	TSTR:SI NPN	PC:250MW FT:220MHZ
Q	16	1	2SC828A-RS	TSTR:SI NPN	PC:250MW FT:220MHZ
Q	17	1	2SC828A-RS	TSTR:SI NPN	PC:250MW FT:220MHZ
Q	18	1	2SC828A-RS	TSTR:SI NPN	PC:250MW FT:220MHZ
Q	19	1	2SC828A-RS	TSTR:SI NPN	PC:250MW FT:220MHZ
Q	20	1	2SC828A-RS	TSTR:SI NPN	PC:250MW FT:220MHZ
Q	21	1	2SA564A-RS	TSTR:SI PNP	PC:250MW FT:80MHZ
Q	22	1	2SC828A-RS	TSTR:SI NPN	PC:250MW FT:220MHZ
Q	23	1	2SC828A-RS	TSTR:SI NPN	PC:250MW FT:220MHZ
Q	25	1	2SC828A-RS	TSTR:SI NPN	PC:250MW FT:220MHZ
Q	26	1	2SB691-PQ	TSTR:GE PNP	PC:600MW FT:7MHZ
Q	27	1	2SA699A-QR	TSTR:SI PNP	PC:10W FT:150MHZ
Q	28	1	2SA777-RS	TSTR:SI PNP	PC:750MW FT:120MHZ
R	1	1	EVKZ53Z56172	R:VAR CARBON	500K-10K OHM 20% 1/5W
R	2	1	ERD25TJ474V	R:FXD CARBON	470K OHM 5% 1/4W
R	4	1	ERD25TJ223V	R:FXD CARBON	22K OHM 5% 1/4W
R	5	1	ERD25TJ154V	R:FXD CARBON	150K OHM 5% 1/4W
R	6	1	ERD25TJ222V	R:FXD CARBON	2.2K OHM 5% 1/4W
R	7	1	ERD25TJ472V	R:FXD CARBON	4.7K OHM 5% 1/4W
R	8	1	ERD25TJ472V	R:FXD CARBON	4.7K OHM 5% 1/4W
R	9	1	ERD25TJ683V	R:FXD CARBON	68K OHM 5% 1/4W
R	10	1	ERD25TJ683V	R:FXD CARBON	68K OHM 5% 1/4W
R	11	1	ERD25TJ471V	R:FXD CARBON	470 OHM 5% 1/4W
R	12	1	EVTR3SA00B13	R:VAR CARBON	1K OHM 20% 1/4W
R	13	1	ERD25TJ472V	R:FXD CARBON	4.7K OHM 5% 1/4W
R	14	1	ERD25TJ472V	R:FXD CARBON	4.7K OHM 5% 1/4W
R	15	1	ERD25TJ182V	R:FXD CARBON	1.8K OHM 5% 1/4W
R	16	1	EVTR3SA00B14	R:VAR CARBON	10K OHM 20% 1/4W

MONITOR DWG NO 4G203006-1

REF NO	QTY	PART NO	DESCRIPTION	
R 17	1	ERD25TJ222V	R:FXD CARBON	2.2K OHM 5% 1/4W
R 18	1	ERD25TJ222V	R:FXD CARBON	2.2K OHM 5% 1/4W
R 19	1	ERD25TJ222V	R:FXD CARBON	2.2K OHM 5% 1/4W
R 20	1	ERX2ANJ1R5	R:FXD MET OXD	1.5 OHM 5% 2W
R 21	1	ERX2ANJ1R5	R:FXD MET OXD	1.5 OHM 5% 2W
R 22	1	ERD25TJ103V	R:FXD CARBON	10K OHM 5% 1/4W
R 23	1	ERD25TJ103V	R:FXD CARBON	10K OHM 5% 1/4W
R 30	1	ERD25TJ102V	R:FXD CARBON	1K OHM 5% 1/4W
R 31	1	ERD25TJ103V	R:FXD CARBON	10K OHM 5% 1/4W
R 31	1	ERD25TJ223V	R:FXD CARBON	22K OHM 5% 1/4W
R 32	1	ERD25TJ153V	R:FXD CARBON	15K OHM 5% 1/4W
R 33	1	ERD25TJ153V	R:FXD CARBON	15K OHM 5% 1/4W
R 34	1	ERD25TJ332V	R:FXD CARBON	3.3K OHM 5% 1/4W
R 35	1	ERD25TJ332V	R:FXD CARBON	3.3K OHM 5% 1/4W
R 36	1	ERD25TJ332V	R:FXD CARBON	3.3K OHM 5% 1/4W
R 38	1	ERD25TJ223V	R:FXD CARBON	22K OHM 5% 1/4W
R 39	1	EVTR3SA00B14	R:VAR CARBON	10K OHM 20% 1/4W
R 40	1	ERD25TJ103V	R:FXD CARBON	10K OHM 5% 1/4W
R 41	1	ERD25TJ332V	R:FXD CARBON	3.3K OHM 5% 1/4W
R 42	1	ERD25TJ103V	R:FXD CARBON	10K OHM 5% 1/4W
R 43	1	ERD25TJ103V	R:FXD CARBON	10K OHM 5% 1/4W
R 44	1	ERD25TJ332V	R:FXD CARBON	3.3K OHM 5% 1/4W
R 45	1	ERD25TJ471V	R:FXD CARBON	470 OHM 5% 1/4W
R 46	1	EVTR3SA00B13	R:VAR CARBON	1K OHM 20% 1/4W
R 47	1	ERD25TJ681V	R:FXD CARBON	680 OHM 5% 1/4W
R 48	1	ERD25TJ471V	R:FXD CARBON	470 OHM 5% 1/4W
R 49	1	ERD25TJ471V	R:FXD CARBON	470 OHM 5% 1/4W
R 50	1	ERD25TJ4R7V	R:FXD CARBON	4.7 OHM 5% 1/4W
R 51	1	ERD25TJ4R7V	R:FXD CARBON	4.7 OHM 5% 1/4W
R 60	1	ERD25TJ103V	R:FXD CARBON	10K OHM 5% 1/4W
R 61	1	ERD25TJ473V	R:FXD CARBON	47K OHM 5% 1/4W
R 63	1	ERD25TJ152V	R:FXD CARBON	1.5K OHM 5% 1/4W
R 64	1	ERD25TJ682V	R:FXD CARBON	6.8K OHM 5% 1/4W
R 65	1	ERD25TJ472V	R:FXD CARBON	4.7K OHM 5% 1/4W
R 66	1	ERD25TJ103V	R:FXD CARBON	10K OHM 5% 1/4W
R 67	1	ERD25TJ682V	R:FXD CARBON	6.8K OHM 5% 1/4W
R 68	1	EVTR3SA00B14	R:VAR CARBON	10K OHM 20% 1/4W
R 69	1	ERD25TJ101V	R:FXD CARBON	100 OHM 5% 1/4W
R 71	1	ERD25TJ682V	R:FXD CARBON	6.8K OHM 5% 1/4W
R 73	1	ERD25TJ392V	R:FXD CARBON	3.9K OHM 5% 1/4W
R 74	1	ERD25TJ333V	R:FXD CARBON	33K OHM 5% 1/4W
R 75	1	ERD25TJ473V	R:FXD CARBON	47K OHM 5% 1/4W
R 76	1	ERD25TJ473V	R:FXD CARBON	47K OHM 5% 1/4W
R 77	1	ERD25TJ103V	R:FXD CARBON	10K OHM 5% 1/4W
R 78	1	ERD25TJ103V	R:FXD CARBON	10K OHM 5% 1/4W

MONITOR DWG NO 4G203006-1

REF NO	QTY	PART NO	DESCRIPTION	
R 79	1	ERD25TJ101V	R:FXD CARBON	100 OHM 5% 1/4W
R 80	1	ERD25TJ223V	R:FXD CARBON	22K OHM 5% 1/4W
R 81	1	ERD25TJ222V	R:FXD CARBON	2.2K OHM 5% 1/4W
R 82	1	ERD25TJ123V	R:FXD CARBON	12K OHM 5% 1/4W
R 83	1	ERD25TJ332V	R:FXD CARBON	3.3K OHM 5% 1/4W
R 84	1	ERD25TJ103V	R:FXD CARBON	10K OHM 5% 1/4W
R 85	1	ERD25TJ102V	R:FXD CARBON	1K OHM 5% 1/4W
R 86	1	ERD25TJ222V	R:FXD CARBON	2.2K OHM 5% 1/4W
R 90	1	ERD25TJ472V	R:FXD CARBON	4.7K OHM 5% 1/4W
R 91	1	ERD25TJ474V	R:FXD CARBON	470K OHM 5% 1/4W
R 93	1	ERD25TJ103V	R:FXD CARBON	10K OHM 5% 1/4W
R 94	1	ERC12GJ105	R:FXD COMP	1M OHM 5% 1/2W
R 95	1	EVTR3SA00B54	R:VAR CARBON	50K OHM 20% 1/4W
R 96	1	ERD25TJ223V	R:FXD CARBON	22K OHM 5% 1/4W
R 97	1	ERC12GK335	R:FXD COMP	3.3M OHM 10% 1/2W
R 98	1	EVTR3SA00B55	R:VAR CARBON	500K OHM 20% 1/4W
R 99	1	ERD25TJ104V	R:FXD CARBON	100K OHM 5% 1/4W
R 101	1	ERD25TJ471V	R:FXD CARBON	470 OHM 5% 1/4W
R 102	1	ERD25TJ103V	R:FXD CARBON	10K OHM 5% 1/4W
R 103	1	ERD25TJ333V	R:FXD CARBON	33K OHM 5% 1/4W
R 104	1	ERD25TJ103V	R:FXD CARBON	10K OHM 5% 1/4W
R 105	1	ERG1ANJ680	R:FXD MET OXD	68 OHM 5% 1W
R 134	1	EVKZ53Z56B14	R:VAR CARBON	10K X2 OHM 20% 1/5W
R 151	1	ERD25TJ271V	R:FXD CARBON	270 OHM 5% 1/4W
R 152	1	ERD25TJ222V	R:FXD CARBON	2.2K OHM 5% 1/4W
R 153	1	EVTR3SA00B52	R:VAR CARBON	500 OHM 20% 1/4W
R 154	1	ERD25TJ682V	R:FXD CARBON	6.8K OHM 5% 1/4W
R 155	1	ERD25TJ271V	R:FXD CARBON	270 OHM 5% 1/4W
R 156	1	EVTR3SA00B13	R:VAR CARBON	1K OHM 20% 1/4W
R 157	1	ERO25CKF6981	R:FXD MET FLM	6.98K OHM 1% 1/4W
R 158	1	ERO25CKF2431	R:FXD MET FLM	2.43K OHM 1% 1/4W
R 159	1	ERX1ANJR82	R:FXD MET OXD	0.82 OHM 5% 1W
R 161	1	ERD25TJ474V	R:FXD CARBON	470K OHM 5% 1/4W
R 162	1	EVTR3SA00B55	R:VAR CARBON	500K OHM 20% 1/4W
R *163	1	ERD25TJ332V	R:FXD CARBON	3.3K OHM 5% 1/4W
R 200	1	ERD25TJ101V	R:FXD CARBON	100 OHM 5% 1/4W
U 1	1	UPC451C	IC:OP AMP	QUAD
U 2	1	UPC157C	IC:OP AMP	
U 3	1	UPC142A	IC:V RGLTR	NEGATIVE ADJUSTABLE REG
XDS 1	1	163683-1	CONNECTOR:PIN	CIS 3P 2.5PITCH

VTO DRIVE DWG NO 4G203007

REF	NO	QTY	PART NO	DESCRIPTION	
E	1	1	CM2	CONNECTOR	POWER AC125V 15A
E	2	1	R76K-SR5P4	BUSHING-SR-5P-4	
F	**	1	TSC1A	FUSE	1A 250V 20MM
F	1	1	TSC1A	FUSE	1A 250V 20MM
R	100	1	EVHZ71Z08B15	R:VAR CARBON	100K OHM 20% 1/5W
R	106	1	ERD25TJ562V	R:FXD CARBON	5.6K OHM 5% 1/4W
R	107	1	EVTR3SA00B14	R:VAR CARBON	10K OHM 20% 1/4W
R	108	1	ERD25TJ472V	R:FXD CARBON	4.7K OHM 5% 1/4W
R	109	1	EVTR3SA00B14	R:VAR CARBON	10K OHM 20% 1/4W
R	128	1	ERD25TJ104V	R:FXD CARBON	100K OHM 5% 1/4W
R	130	1	ERD25TJ104V	R:FXD CARBON	100K OHM 5% 1/4W
R	131	1	EVTR3SA00B54	R:VAR CARBON	50K OHM 20% 1/4W
R	132	1	ERD25TJ223V	R:FXD CARBON	22K OHM 5% 1/4W
R	133	1	ERD25TJ562V	R:FXD CARBON	5.6K OHM 5% 1/4W
R	136	1	ERD25TJ103V	R:FXD CARBON	10K OHM 5% 1/4W
W	1	1	77W02	CABLE:PWR (UL,CSA)	125V 10A

VTO DWG NO 4G203008-1

REF	NO	QTY	PART NO	DESCRIPTION	
C	1	1	ECCD1H100DU	C:FXD CER TC	10PF +-0.5PF 50V N750
C	2	1	ECCW1H151KC5	C:FXD CER TC	150PF +-10% 50V NPO
C	3	1	ECCD1H330JU	C:FXD CER TC	33PF +-5% 50V N750
C	4	1	ECKW1H103ZF5	C:FXD CER HI-K	10000PF +80-20% 50V
C	5	1	ECKW1H103ZF5	C:FXD CER HI-K	10000PF +80-20% 50V
C	6	1	ECEA1AS101	C:FXD AL ELECT	100UF +-20% 10V
C	7	1	ECEA1CS101	C:FXD AL ELECT	100UF +-20% 16V
C	8	1	ECKW1H103ZF5	C:FXD CER HI-K	10000PF +80-20% 50V
C	11	1	ECKW1H102KB5	C:FXD CER HI-K	1000PF +-10% 50V
C	12	1	ECKW1H102KB5	C:FXD CER HI-K	1000PF +-10% 50V
C	14	1	ECKW1H471KB5	C:FXD CER HI-K	470PF +-10% 50V
C	15	1	ECKD1E104ZFZ	C:FXD CER HI-K	100000PF +80-20% 25V
C	16	1	ECKD1E104ZFZ	C:FXD CER HI-K	100000PF +80-20% 25V
C	21	1	ECCW1H101KC5	C:FXD CER TC	100PF +-10% 50V NPO
C	22	1	ECKF1H103ZF	C:FXD CER HI-K	10000PF +80-20% 50V
C	23	1	ECKW1H222MD5	C:FXD CER HI-K	2200PF +-20% 50V
C	24	1	ECKW1H103ZF5	C:FXD CER HI-K	10000PF +80-20% 50V
C	25	1	ECKW1H471KB5	C:FXD CER HI-K	470PF +-10% 50V
C	26	1	ECKW1H471KB5	C:FXD CER HI-K	470PF +-10% 50V
C	27	1	ECKD1E104ZFZ	C:FXD CER HI-K	100000PF +80-20% 25V
C	31	1	ECKW1H103ZF5	C:FXD CER HI-K	10000PF +80-20% 50V
C	32	1	ECKW1H103ZF5	C:FXD CER HI-K	10000PF +80-20% 50V
C	33	1	ECEA1AS101	C:FXD AL ELECT	100UF +-20% 10V
C	34	1	ECKW1H103ZF5	C:FXD CER HI-K	10000PF +80-20% 50V
C	35	1	ECEA1CS101	C:FXD AL ELECT	100UF +-20% 16V
C	36	1	ECKW1H103ZF5	C:FXD CER HI-K	10000PF +80-20% 50V
C	37	1	ECKW1H103ZF5	C:FXD CER HI-K	10000PF +80-20% 50V
C	38	1	ECKW1H103ZF5	C:FXD CER HI-K	10000PF +80-20% 50V
C	41	1	ECCW1H101KC5	C:FXD CER TC	100PF +-10% 50V NPO
C	42	1	ECKW1H102KB5	C:FXD CER HI-K	1000PF +-10% 50V
C	43	1	ECKW1H331KB5	C:FXD CER HI-K	330PF +-10% 50V
C	44	1	ECCW1H101KC5	C:FXD CER TC	100PF +-10% 50V NPO
C	45	1	ECKW1H103ZF5	C:FXD CER HI-K	10000PF +80-20% 50V
C	46	1	ECKW1H103ZF5	C:FXD CER HI-K	10000PF +80-20% 50V
C	47	1	ECCD1H220JU	C:FXD CER TC	22PF +-5% 50V N750
C	48	1	ECKW1H472MD5	C:FXD CER HI-K	4700PF +-20% 50V
C	49	1	ECEA1CS100	C:FXD AL ELECT	10UF +-20% 16V
C	50	1	ECKW1H103ZF5	C:FXD CER HI-K	10000PF +80-20% 50V
C	51	1	ECEA1AS101	C:FXD AL ELECT	100UF +-20% 10V
C	52	1	ECKD1E473ZF2	C:FXD CER HI-K	47000PF +80-20% 25V
C	53	1	ECKD1E473ZF2	C:FXD CER HI-K	47000PF +80-20% 25V
C	54	1	ECKD1E473ZF2	C:FXD CER HI-K	47000PF +80-20% 25V
C	55	1	ECKD1E473ZF2	C:FXD CER HI-K	47000PF +80-20% 25V
C	56	1	ECKD1E473ZF2	C:FXD CER HI-K	47000PF +80-20% 25V
C	61	1	ECKW1H102KB5	C:FXD CER HI-K	1000PF +-10% 50V

VTO DWG NO 4G203008-1

REF NO	QTY	PART NO	DESCRIPTION	
C 62	1	ECKW1H681KB5	C:FXD CER HI-K	680PF +-10% 50V
C 63	1	ECKW1H681KB5	C:FXD CER HI-K	680PF +-10% 50V
C 64	1	ECKW1H102KB5	C:FXD CER HI-K	1000PF +-10% 50V
C 65	1	ECKW1H221KB5	C:FXD CER HI-K	220PF +-10% 50V
C 66	1	ECKW1H391KB5	C:FXD CER HI-K	390PF +-10% 50V
C 67	1	ECKW1H102KB5	C:FXD CER HI-K	1000PF +-10% 50V
C 68	1	ECKW1H103ZF5	C:FXD CER HI-K	10000PF +80-20% 50V
C 71	1	SR305E105Z	C:FXD CER MULTILAYER	1UF +-1% 25V
C 72	1	ECKW1H472MD5	C:FXD CER HI-K	4700PF +-20% 50V
C 73	1	SR305E105Z	C:FXD CER MULTILAYER	1UF +-1% 25V
C 74	1	ECKW1H223ZF5	C:FXD CER HI-K	22000PF +80-20% 50V
C 75	1	SR305E105Z	C:FXD CER MULTILAYER	1UF +-1% 25V
C 76	1	ECKD1E473ZF2	C:FXD CER HI-K	47000PF +80-20% 25V
C 77	1	SR305E105Z	C:FXD CER MULTILAYER	1UF +-1% 25V
C 81	1	ECKW1H103ZF5	C:FXD CER HI-K	10000PF +80-20% 50V
C 82	1	ECKD1E473ZF2	C:FXD CER HI-K	47000PF +80-20% 25V
C 83	1	ECKD1E473ZF2	C:FXD CER HI-K	47000PF +80-20% 25V
C 84	1	ECKD1E473ZF2	C:FXD CER HI-K	47000PF +80-20% 25V
C 85	1	ECKD1E473ZF2	C:FXD CER HI-K	47000PF +80-20% 25V
CR 1	1	MA322-MC	DIODE:SI	20MA 30V
CR 2	1	1SV34	DIODE:PIN	50MA 100V
CR 3	1	MA150TA	DIODE:SI	100MA 35V
CR 4	1	1SS16	DIODE:SCHOTTKY	30MA 5V
CR 11	1	MA56	DIODE:SI	100MA 20V
CR 12	1	MA56	DIODE:SI	100MA 20V
CR 13	1	MA56	DIODE:SI	100MA 20V
CR 14	1	MA56	DIODE:SI	100MA 20V
CR 15	1	MA56	DIODE:SI	100MA 20V
CR 16	1	MA56	DIODE:SI	100MA 20V
E 1	1	3G400852	P8911A PC BOARD	VTO
J 1	1	77J01	Q075A84 CONNECTOR	BNC PANEL JACK
J 2	1	UMQR1	CONNECTOR:COAX	RECEPT
L 1	1	4G431194	P8911A COIL	VTO OSC
L 2	1	4G431195	P8911A COIL	TUNING
L 3	1	TP0206L560K	COIL:CHOKE	56UH 10%
L 4	1	TP0206L820K	COIL:CHOKE	82UH 10%
L 5	1	3L0004	FERRITE CORE	
L 6	1	3L0004	FERRITE CORE	
L 7	1	3L0004	FERRITE CORE	
L 8	1	3L0004	FERRITE CORE	
L 9	1	3L0004	FERRITE CORE	
L 10	1	3L0004	FERRITE CORE	
P 1	1	M3110S13	CONNECTOR:PIN	10P L:300

VTO DWG NO 4G203008-1

REF NO	QTY	PART NO	DESCRIPTION	
Q 1	1	2SK19-GR	TSTR:FET	PC:200MW
Q 2	1	2SC828A-RS	TSTR:SI NPN	PC:250MW FT:220MHZ
Q 3	1	2SC828A-RS	TSTR:SI NPN	PC:250MW FT:220MHZ
Q 4	1	2SC828A-RS	TSTR:SI NPN	PC:250MW FT:220MHZ
Q 5	1	2SC828A-RS	TSTR:SI NPN	PC:250MW FT:220MHZ
Q 6	1	2SC828A-RS	TSTR:SI NPN	PC:250MW FT:220MHZ
Q 7	1	2SC1215	TSTR:SI NPN	PC:200MW FT:1200MHZ
Q 8	1	2SC1215	TSTR:SI NPN	PC:200MW FT:1200MHZ
Q 9	1	2SC1215	TSTR:SI NPN	PC:200MW FT:1200MHZ
Q 10	1	2SK19-GR	TSTR:FET	PC:200MW
Q 11	1	2SC828A-RS	TSTR:SI NPN	PC:250MW FT:220MHZ
Q 12	1	2SA564A-RS	TSTR:SI PNP	PC:250MW FT:80MHZ
Q 13	1	2SA564A-RS	TSTR:SI PNP	PC:250MW FT:80MHZ
Q 14	1	2SC828A-RS	TSTR:SI NPN	PC:250MW FT:220MHZ
Q 15	1	2SA564A-RS	TSTR:SI PNP	PC:250MW FT:80MHZ
Q 16	1	2SA564A-RS	TSTR:SI PNP	PC:250MW FT:80MHZ
Q 17	1	2SC828A-RS	TSTR:SI NPN	PC:250MW FT:220MHZ
Q 18	1	2SA564A-RS	TSTR:SI PNP	PC:250MW FT:80MHZ
Q 19	1	2SA564A-RS	TSTR:SI PNP	PC:250MW FT:80MHZ
R 1	1	ERD25TJ223V	R:FXD CARBON	22K OHM 5% 1/4W
R 2	1	ERD25TJ103V	R:FXD CARBON	10K OHM 5% 1/4W
R 3	1	ERD25TJ472V	R:FXD CARBON	4.7K OHM 5% 1/4W
R 4	1	ERD25TJ223V	R:FXD CARBON	22K OHM 5% 1/4W
R 5	1	ERD25TJ474V	R:FXD CARBON	470K OHM 5% 1/4W
R 6	1	ERD25TJ104V	R:FXD CARBON	100K OHM 5% 1/4W
R 7	1	ERD25TJ391V	R:FXD CARBON	390 OHM 5% 1/4W
R 8	1	ERD25TJ221V	R:FXD CARBON	220 OHM 5% 1/4W
R 9	1	ERD25TJ222V	R:FXD CARBON	2.2K OHM 5% 1/4W
R 11	1	ERD25TJ221V	R:FXD CARBON	220 OHM 5% 1/4W
R 12	1	ERD25TJ103V	R:FXD CARBON	10K OHM 5% 1/4W
R 13	1	ERD25TJ220V	R:FXD CARBON	22 OHM 5% 1/4W
R 13	1	ERD25TJ222V	R:FXD CARBON	2.2K OHM 5% 1/4W
R 14	1	ERD25TJ682V	R:FXD CARBON	6.8K OHM 5% 1/4W
R 15	1	ERD25TJ682V	R:FXD CARBON	6.8K OHM 5% 1/4W
R 16	1	ERD25TJ331V	R:FXD CARBON	330 OHM 5% 1/4W
R 17	1	ERD25TJ102V	R:FXD CARBON	1K OHM 5% 1/4W
R 18	1	ERD25TJ103V	R:FXD CARBON	10K OHM 5% 1/4W
R 19	1	ERD25TJ472V	R:FXD CARBON	4.7K OHM 5% 1/4W
R 20	1	ERD25TJ152V	R:FXD CARBON	1.5K OHM 5% 1/4W
R 21	1	ERD25TJ101V	R:FXD CARBON	100 OHM 5% 1/4W
R 22	1	ERD25TJ152V	R:FXD CARBON	1.5K OHM 5% 1/4W
R 25	1	ERD25TJ474V	R:FXD CARBON	470K OHM 5% 1/4W
R 26	1	ERD25TJ243V	R:FXD CARBON	24K OHM 5% 1/4W
R 27	1	ERD25TJ103V	R:FXD CARBON	10K OHM 5% 1/4W

VTO DWG NO 4G203008-1

REF NO	QTY	PART NO	DESCRIPTION	
R 28	1	ERD25TJ102V	R:FXD CARBON	1K OHM 5% 1/4W
R 29	1	ERD25TJ104V	R:FXD CARBON	100K OHM 5% 1/4W
R 30	1	ERD25TJ153V	R:FXD CARBON	15K OHM 5% 1/4W
R 31	1	ERD25TJ271V	R:FXD CARBON	270 OHM 5% 1/4W
R 32	1	ERD25TJ331V	R:FXD CARBON	330 OHM 5% 1/4W
R 33	1	ERD25TJ222V	R:FXD CARBON	2.2K OHM 5% 1/4W
R 34	1	ERD25TJ821V	R:FXD CARBON	820 OHM 5% 1/4W
R 35	1	ERD25TJ473V	R:FXD CARBON	47K OHM 5% 1/4W
R 36	1	ERD25TJ104V	R:FXD CARBON	100K OHM 5% 1/4W
R 37	1	ERD25TJ472V	R:FXD CARBON	4.7K OHM 5% 1/4W
R 38	1	ERD25TJ103V	R:FXD CARBON	10K OHM 5% 1/4W
R 39	1	ERD25TJ472V	R:FXD CARBON	4.7K OHM 5% 1/4W
R 40	1	ERD25TJ431V	R:FXD CARBON	430 OHM 5% 1/4W
R 41	1	ERD25TJ103V	R:FXD CARBON	10K OHM 5% 1/4W
R 42	1	ERD25TJ472V	R:FXD CARBON	4.7K OHM 5% 1/4W
R 43	1	ERD25TJ102V	R:FXD CARBON	1K OHM 5% 1/4W
R 44	1	ERD25TJ102V	R:FXD CARBON	1K OHM 5% 1/4W
R 45	1	ERD25TJ681V	R:FXD CARBON	680 OHM 5% 1/4W
R 46	1	ERD25TJ822V	R:FXD CARBON	8.2K OHM 5% 1/4W
R 47	1	ERD25TJ332V	R:FXD CARBON	3.3K OHM 5% 1/4W
R 48	1	ERD25TJ102V	R:FXD CARBON	1K OHM 5% 1/4W
R 51	1	ERD25TJ152V	R:FXD CARBON	1.5K OHM 5% 1/4W
R 52	1	ERD25TJ100V	R:FXD CARBON	10 OHM 5% 1/4W
R 53	1	ERD25TJ392V	R:FXD CARBON	3.9K OHM 5% 1/4W
R 54	1	ERD25TJ103V	R:FXD CARBON	10K OHM 5% 1/4W
R 55	1	ERD25TJ152V	R:FXD CARBON	1.5K OHM 5% 1/4W
R 56	1	ERD25TJ102V	R:FXD CARBON	1K OHM 5% 1/4W
R 57	1	ERD25TJ471V	R:FXD CARBON	470 OHM 5% 1/4W
R 61	1	ERO25CKF1211	R:FXD MET FLM	1.21K OHM 1% 1/4W
R 62	1	ERO25CKF10R2	R:FXD MET FLM	10.2 OHM 1% 1/4W
R 63	1	ERO25CKF11R5	R:FXD MET FLM	11.5 OHM 1% 1/4W
R 64	1	ERD25TJ102V	R:FXD CARBON	1K OHM 5% 1/4W
R 65	1	ERO25CKF2000	R:FXD MET FLM	200 OHM 1% 1/4W
R 66	1	ERO25CKF3400	R:FXD MET FLM	340 OHM 1% 1/4W
R 67	1	ERO25CKF22R1	R:FXD MET FLM	22.1 OHM 1% 1/4W
R 68	1	ERO25CKF37R4	R:FXD MET FLM	37.4 OHM 1% 1/4W
R 69	1	ERD25TJ102V	R:FXD CARBON	1K OHM 5% 1/4W
R 70	1	ERO25CKF2000	R:FXD MET FLM	200 OHM 1% 1/4W
R 71	1	ERO25CKF1370	R:FXD MET FLM	137 OHM 1% 1/4W
R 72	1	ERO25CKF22R1	R:FXD MET FLM	22.1 OHM 1% 1/4W
R 73	1	ERO25CKF68R1	R:FXD MET FLM	68.1 OHM 1% 1/4W
R 74	1	ERD25TJ102V	R:FXD CARBON	1K OHM 5% 1/4W
R 75	1	ERO25CKF5620	R:FXD MET FLM	562 OHM 1% 1/4W
R 76	1	ERD25TJ222V	R:FXD CARBON	2.2K OHM 5% 1/4W
R 77	1	ERD25TJ153V	R:FXD CARBON	15K OHM 5% 1/4W

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REF NO	QTY	PART NO	DESCRIPTION	
R 78	1	ERD25TJ221V	R:FXD CARBON	220 OHM 5% 1/4W
R 79	1	ERD25TJ183V	R:FXD CARBON	18K OHM 5% 1/4W
R 80	1	ERD25TJ682V	R:FXD CARBON	6.8K OHM 5% 1/4W
R 81	1	ERD25TJ222V	R:FXD CARBON	2.2K OHM 5% 1/4W
R 82	1	ERD25TJ222V	R:FXD CARBON	2.2K OHM 5% 1/4W
R 83	1	ERD25TJ222V	R:FXD CARBON	2.2K OHM 5% 1/4W
R 84	1	ERD25TJ153V	R:FXD CARBON	15K OHM 5% 1/4W
R 85	1	ERD25TJ221V	R:FXD CARBON	220 OHM 5% 1/4W
R 86	1	ERD25TJ183V	R:FXD CARBON	18K OHM 5% 1/4W
R 87	1	ERD25TJ682V	R:FXD CARBON	6.8K OHM 5% 1/4W
R 88	1	ERD25TJ222V	R:FXD CARBON	2.2K OHM 5% 1/4W
R 89	1	ERD25TJ222V	R:FXD CARBON	2.2K OHM 5% 1/4W
R 90	1	ERD25TJ222V	R:FXD CARBON	2.2K OHM 5% 1/4W
R 91	1	ERD25TJ153V	R:FXD CARBON	15K OHM 5% 1/4W
R 92	1	ERD25TJ221V	R:FXD CARBON	220 OHM 5% 1/4W
R 93	1	ERD25TJ183V	R:FXD CARBON	18K OHM 5% 1/4W
R 94	1	ERD25TJ682V	R:FXD CARBON	6.8K OHM 5% 1/4W
R 95	1	ERD25TJ222V	R:FXD CARBON	2.2K OHM 5% 1/4W
R 96	1	ERD25TJ222V	R:FXD CARBON	2.2K OHM 5% 1/4W
U 1	1	UPC157C	IC:OP AMP	
U 2	1	LM1496N	IC:LINEAR	BAL MOD-DEMOD
U 3	1	SN74193N	IC:TTL	REVERS BINARY COUNTER
Y 1	1	4G461201-1	CRYSTAL:QUARTZ OSC	3.875MHZ (HC-18/U)

MECHA-E DWG NO 4G301600

REF NO	QTY	PART NO	DESCRIPTION
	1	2G580119-1W	P8911A PLATE:BOTTOM
	1	2G580121-3FA	P8911A PLATE:REAR
	1	3G612404-0CB	P8911A HEAT SINK
	1	3G630814-2AH	P8911A PANEL
	1	4G550017-3N	P251A STAND
	2	4G614974-0PB	P251A NUT
	1	4G615567-1BB	P8911A BRACKET:VTO
	1	4G633185-1W	P8911A LABEL:IDENT
	1	4G670059-1CB	P8811A CASE:UNIT
	2	4G760025-3G	P251A FOOT,RECTANGULAR
	4	4G760209-0G	FOOT D20

VP-8911A SERIES CIRCUIT DIAGRAMS

		8911A	8912A	8913A	8914A
1. Overall Interconnection	A1	○	○	○	○
2. Monitor	A2	○	○	○	○
3. IF VTO	A3	○			
4. LW-MW VTO	A3		○		
5. SW- VTO	A3			○	
6. FM-VTO	A3				○
7. Marker(1)	A4	○	○	○	○
8. Marker(2) IF	A5	○			
9. Marker(2) LW-MW	A5		○		
10. Marker(2) SW	A5			○	
11. Marker(2) FM	A5				○
12. Matrix	A6		○	○	○

NOTES

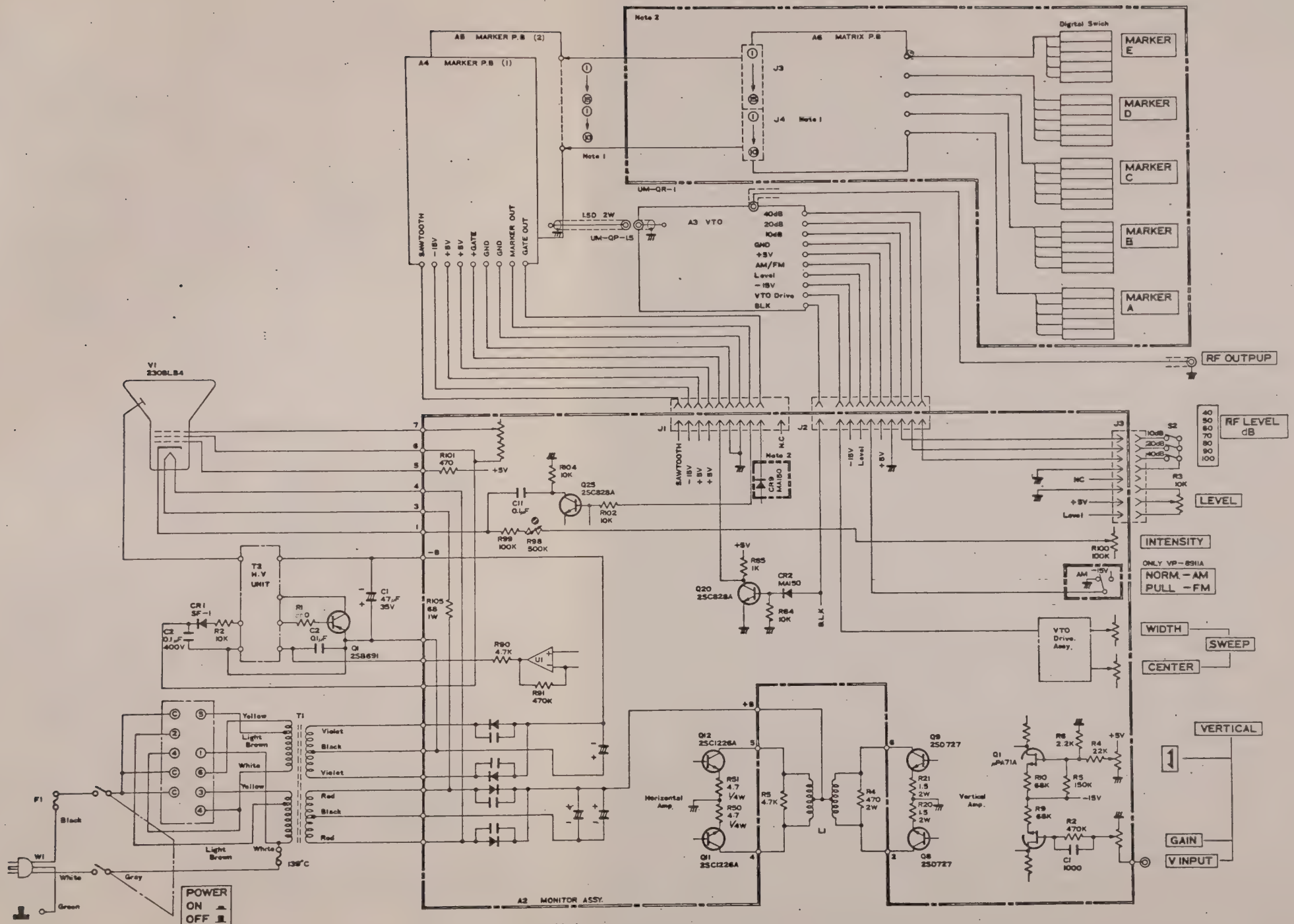
▷ WHEN THE CIRCUIT IS DIVIDED INTO SOME UNITS AND AN IDENTIFYING NUMBER IS ASSIGNED TO EACH UNIT, REFERENCE DESIGNATORS IN EACH CIRCUIT DIAGRAM ARE GIVEN IN ABBREVIATED FORM. PREFIX WITH EACH IDENTIFYING NUMBER FOR COMPLETE DESCRIPTION.
EXAMPLES; A1C1, A6R3.

▷ RESISTANCE VALUES IN OHMS AND CAPACITANCE IN PICOFARADS(FROM 1 TO 9,999) OR MICROFARADS (FROM 0.01 TO 0.99) UNLESS OTHERWISE NOTED.

▷ POWER RATINGS AND RESISTANCE TOLERANCES OF FIXED RESISTORS ARE 1/8 WATTS AND ±5% UNLESS OTHERWISE NOTED.

▷ ✡ FACTORY REWORKED OR CHECKED COMPONENTS.

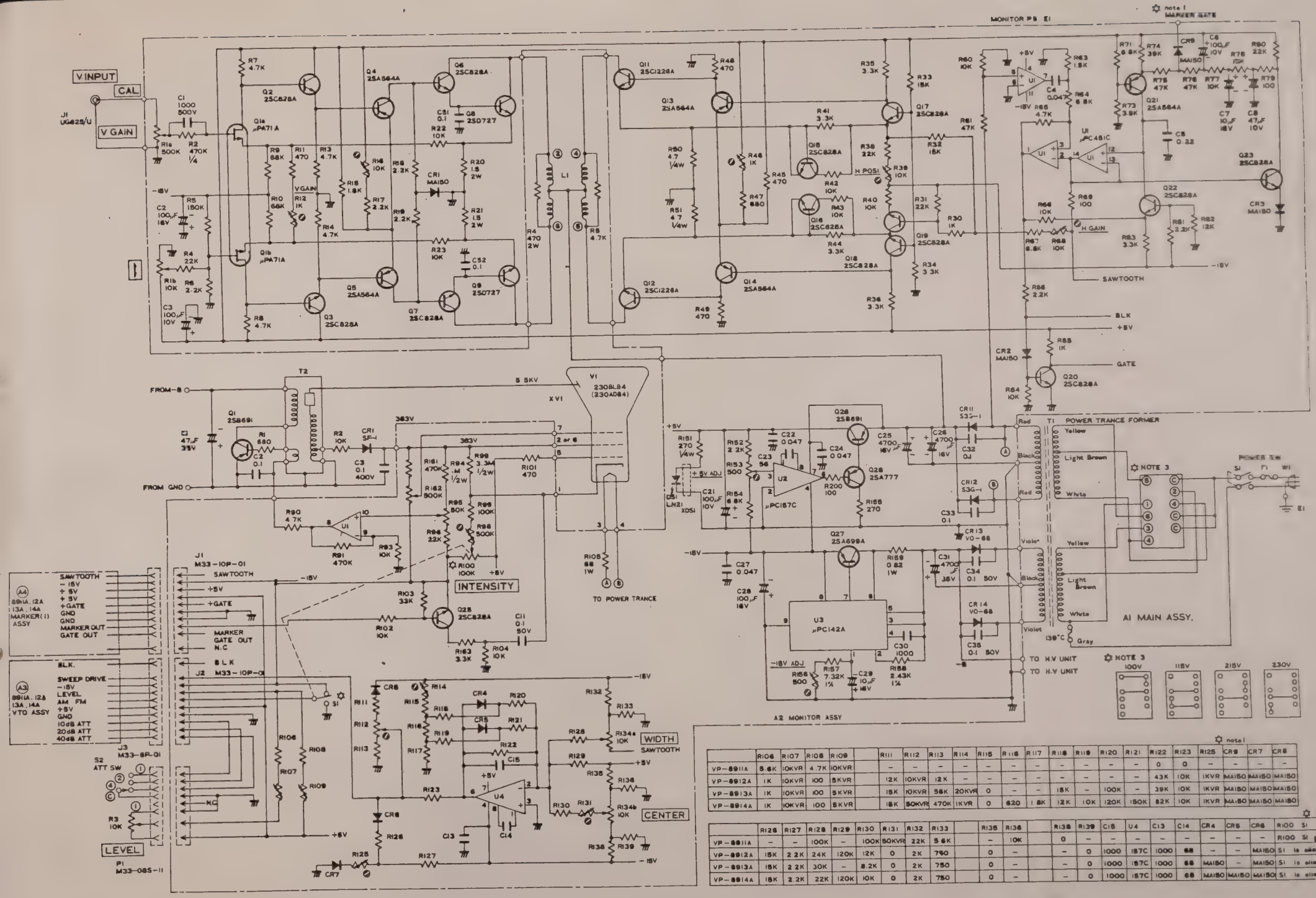
▷ ✱ VALUE SELECTED AT FACTORY. NOMINAL VALUE SHOWN.



Note 1 VP 8911A ① to ⑮ , ① to ⑦
VP-8912A ① to ⑮ , ① to ⑩
VP 8913A ① to ⑮ , ① to ⑩
VP-8914A ① to ⑮ , ① to ⑨

Note 2 VP-8912A, 8913A, 8914A need within [ ]

VP-8911A to VP-8914A OVERALL INTERCONNECTION (A1) 1

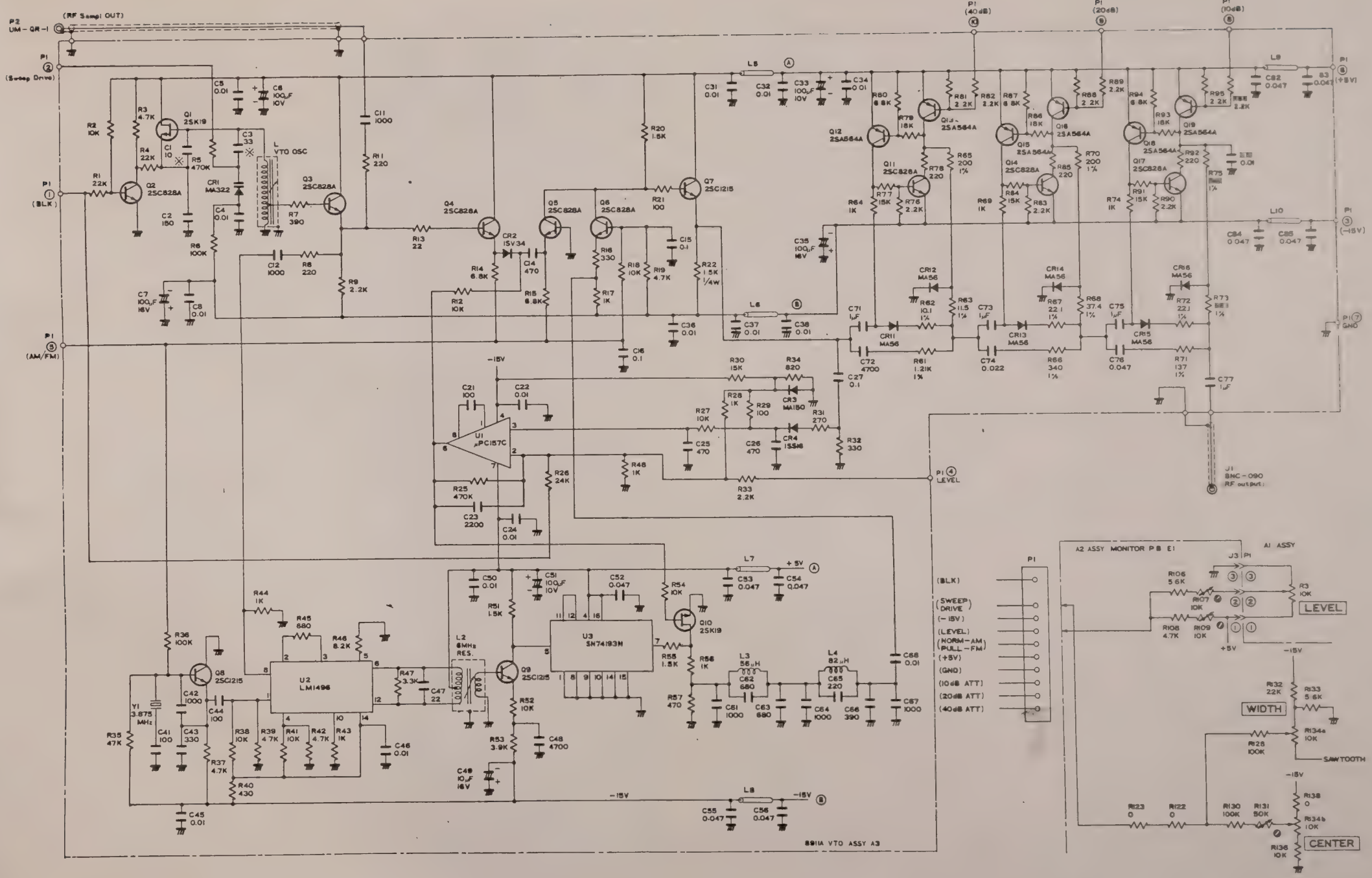


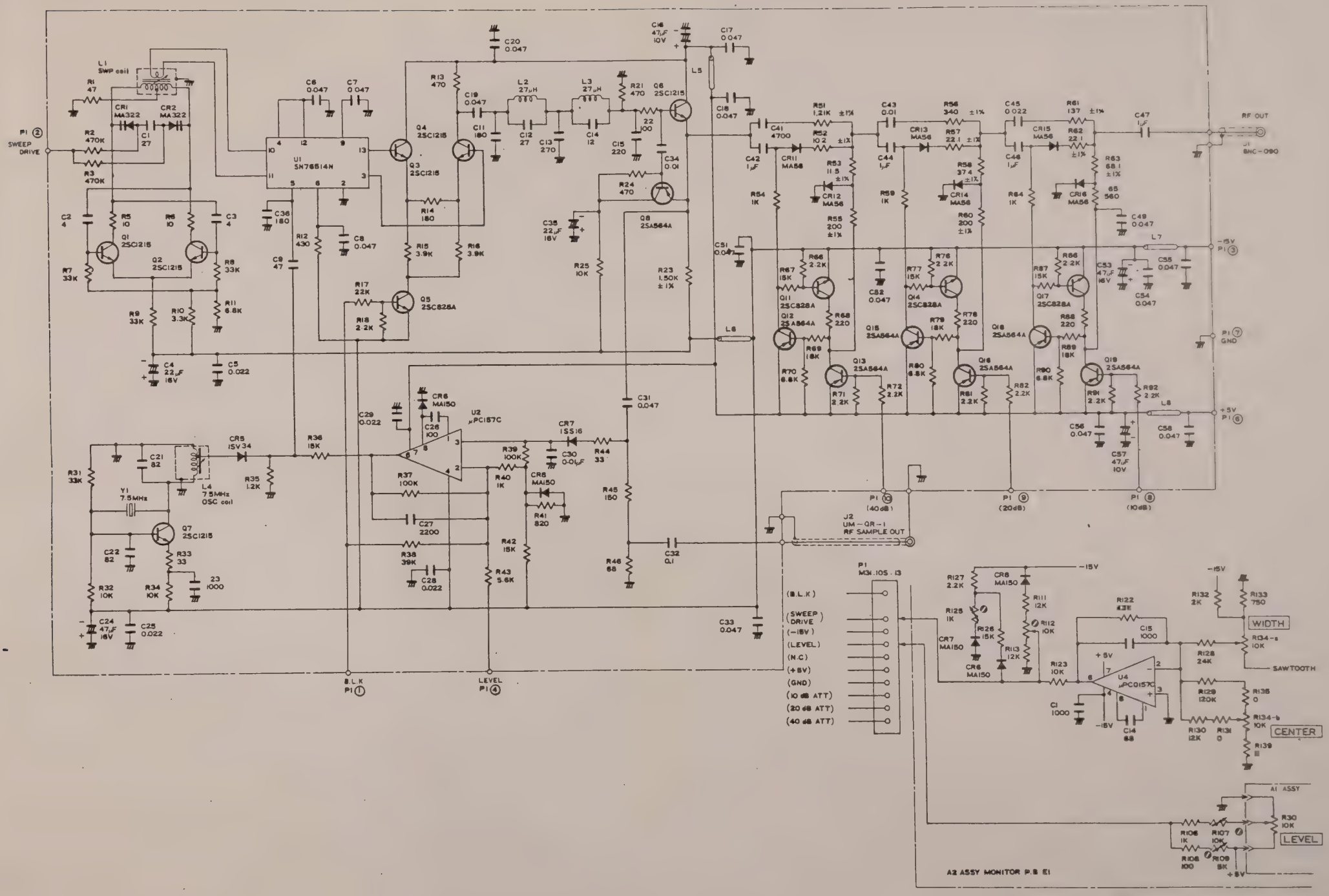
note 1

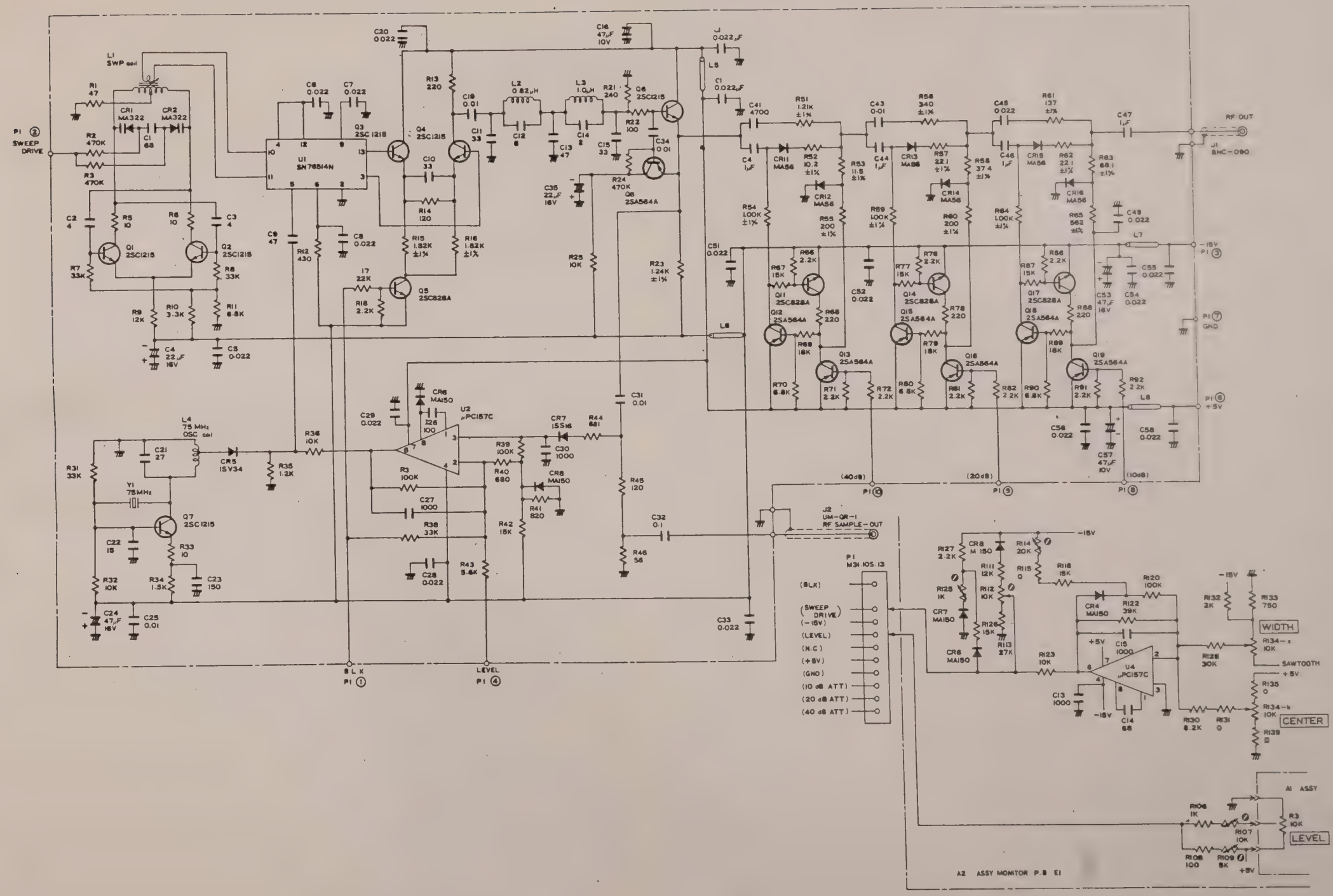
	R106	R107	R108	R109	R111	R112	R113	R114	R115	R116	R117	R118	R119	R120	R121	R122	R123	R125	CR9	CR7	CR8
VP-8911A	5.6K	10KVR	4.7K	10KVR	–	–	–	–	–	–	–	–	–	–	–	0	0	–	–	–	–
VP-8912A	1K	10KVR	100	5KVR	12K	10KVR	12K	–	–	–	–	–	–	–	–	43K	10K	1KVR	MA150	MA150	MA150
VP-8913A	1K	10KVR	100	5KVR	15K	10KVR	56K	20KVR	0	–	–	15K	–	100K	–	39K	10K	1KVR	MA150	MA150	MA150
VP-8914A	1K	10KVR	100	5KVR	15K	50KVR	470K	1KVR	0	620	1.8K	12K	10K	120K	150K	82K	10K	1KVR	MA150	MA150	MA150

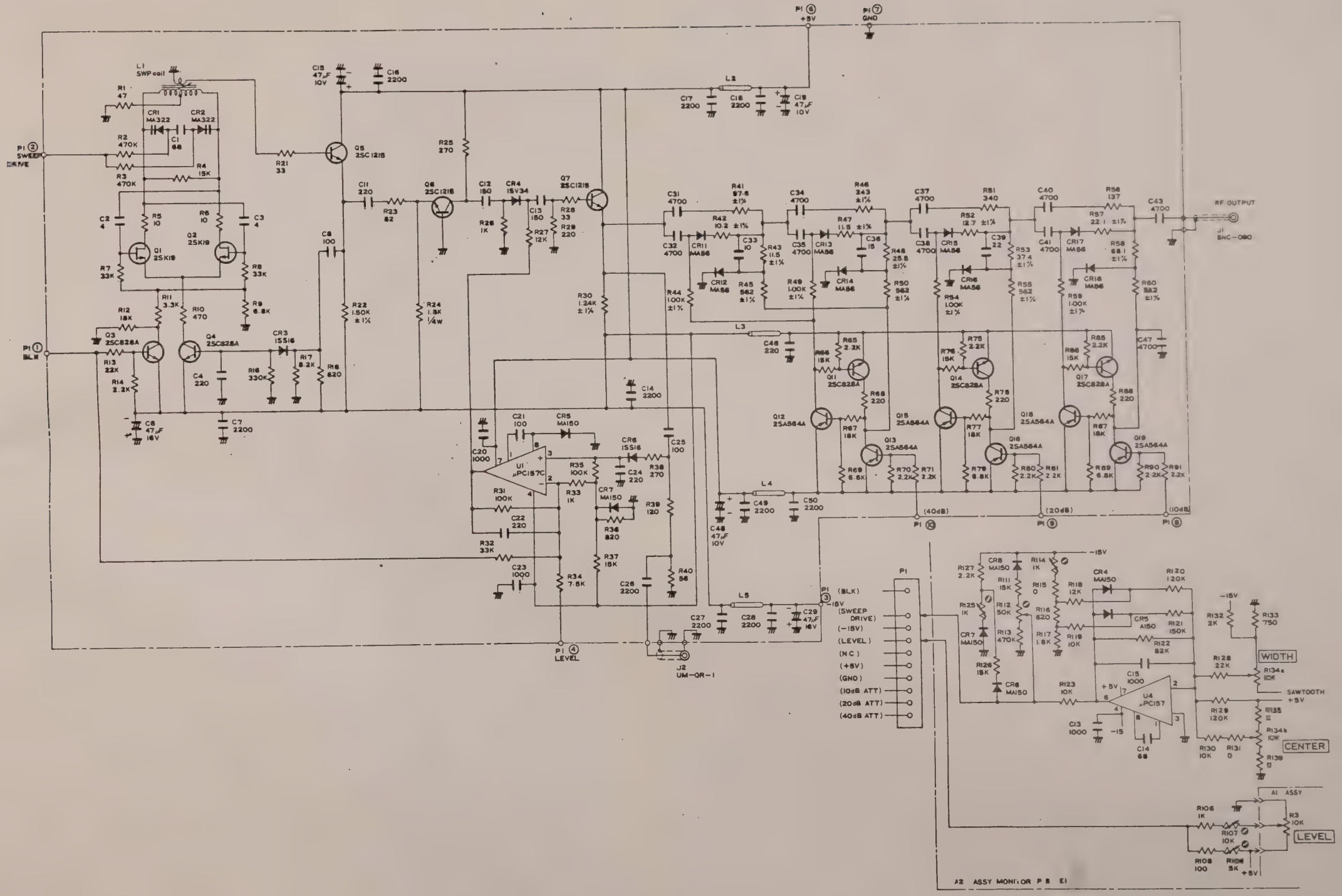
note 2

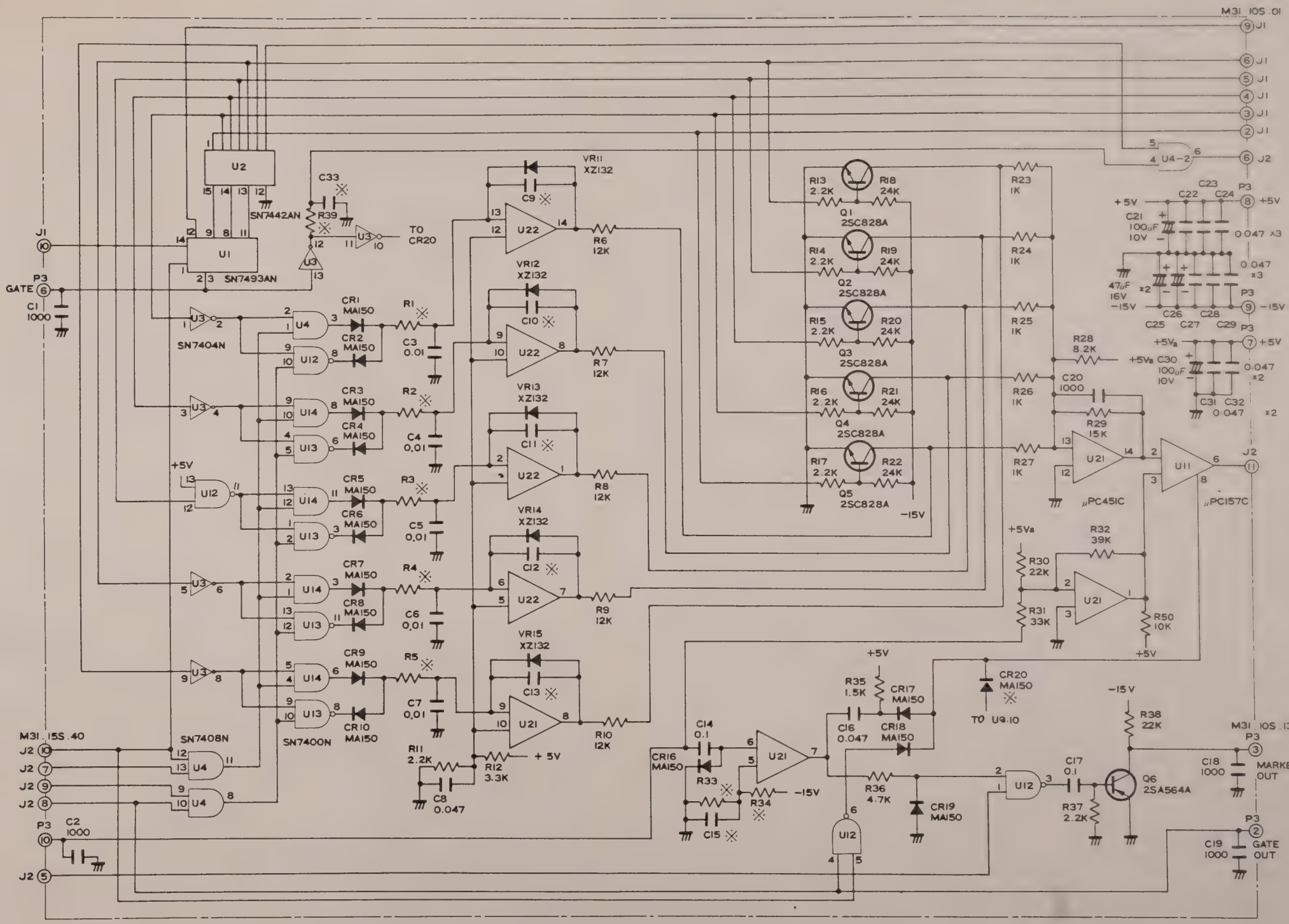
	R126	R127	R128	R129	R130	R131	R132	R133	R135	R136	R138	R139	C15	U4	C13	C14	CR4	CR5	CR6	R100 SI
VP-8911A	–	–	100K	–	100K	50KVR	22K	5.6K	–	10K	0	–	–	–	–	–	–	–	–	R100 SI ganged
VP-8912A	15K	2.2K	24K	120K	12K	0	2K	750	0	–	–	0	1000	157C	1000	68	–	–	MA150	SI is eliminated
VP-8913A	15K	2.2K	30K	–	8.2K	0	2K	750	0	–	–	0	1000	157C	1000	68	MA150	–	MA150	SI is eliminated
VP-8914A	15K	2.2K	22K	120K	10K	0	2K	750	0	–	–	0	1000	157C	1000	68	MA150	MA150	MA150	SI is eliminated


(RF Sampl OUT)
P2 UM-QR-I
P1 (Sweep Drive)
P1 (BLK)
P1 (AM/FM)
P1 (40dB)
P1 (20dB)
P1 (10dB)
P1 (+8V)
P1 (-15V)
P1 GND
P1 LEVEL
J1 BNC-090 RF output
Q1 2SK19
Q2 2SC828A
Q3 2SC828A
Q4 2SC828A
Q5 2SC828A
Q6 2SC828A
Q7 2SC1215
Q8 2SC1215
Q9 2SC1215
Q10 2SK19
Q11 2SC828A
Q12 2SA564A
Q13 2SA564A
Q14 2SC828A
Q15 2SA564A
Q16 2SA564A
Q17 2SC828A
Q18 2SA564A
Q19 2SA564A
CR1 MA322
CR2 15V34
CR3 MA150
CR4 1SS46
CR11 MA56
CR12 MA56
CR13 MA56
CR14 MA56
CR15 MA56
CR16 MA56
U1 μPC157C
U2 LM1496
U3 SN74193N
L VTO OSC
L2 6MHz RES.
L3 56μH
L4 82μH
L5
L6
L7
L8
L9
L10
Y1 3.875 MHz
(BLK)
(SWEEP DRIVE)
(-15V)
(LEVEL)
(NORM-AM PULL-FM)
(+5V)
(GND)
(10dB ATT)
(20dB ATT)
(40dB ATT)
A2 ASSY MONITOR PB E1
A1 ASSY
J3 P1
LEVEL
WIDTH
SAWTOOTH
CENTER
8911A VTO ASSY A3


L1 SWP coil
CR1 MA322
CR2 MA322
C1 27
U1 SN76514N
Q1 2SC1215
Q2 2SC1215
Q3 2SC1215
Q4 2SC1215
Q5 2SC828A
Q6 2SC1215
Q8 2SA564A
L2 27μH
L3 27μH
L5
L6
L7
L8
P1 ② SWEEP DRIVE
P1 ③ -15V
P1 ⑦ GND
P1 ⑥ +5V
P1 ⑤ (40dB)
P1 ⑨ (20dB)
P1 ⑧ (10dB)
RF OUT
J1 BNC-090
J2 UM-QR-1 RF SAMPLE OUT
U2 μPC157C
Y1 7.5MHz
L4 7.5MHz OSC coil
Q7 2SC1215
CR5 1SV34
CR6 MA150
CR7 1SS16
CR8 MA150
Q11 2SC828A
Q12 2SA564A
Q13 2SA564A
Q14 2SC828A
Q15 2SA564A
Q16 2SA564A
Q17 2SC828A
Q18 2SA564A
Q19 2SA564A
P1 M31.105.13
(B.L.K)
(SWEEP DRIVE)
(-15V)
(LEVEL)
(N.C)
(+5V)
(GND)
(10 dB ATT)
(20 dB ATT)
(40 dB ATT)
B.L.K P1 ①
LEVEL P1 ④
WIDTH
SAWTOOTH
CENTER
LEVEL
A1 ASSY
A2 ASSY MONITOR P.B E1

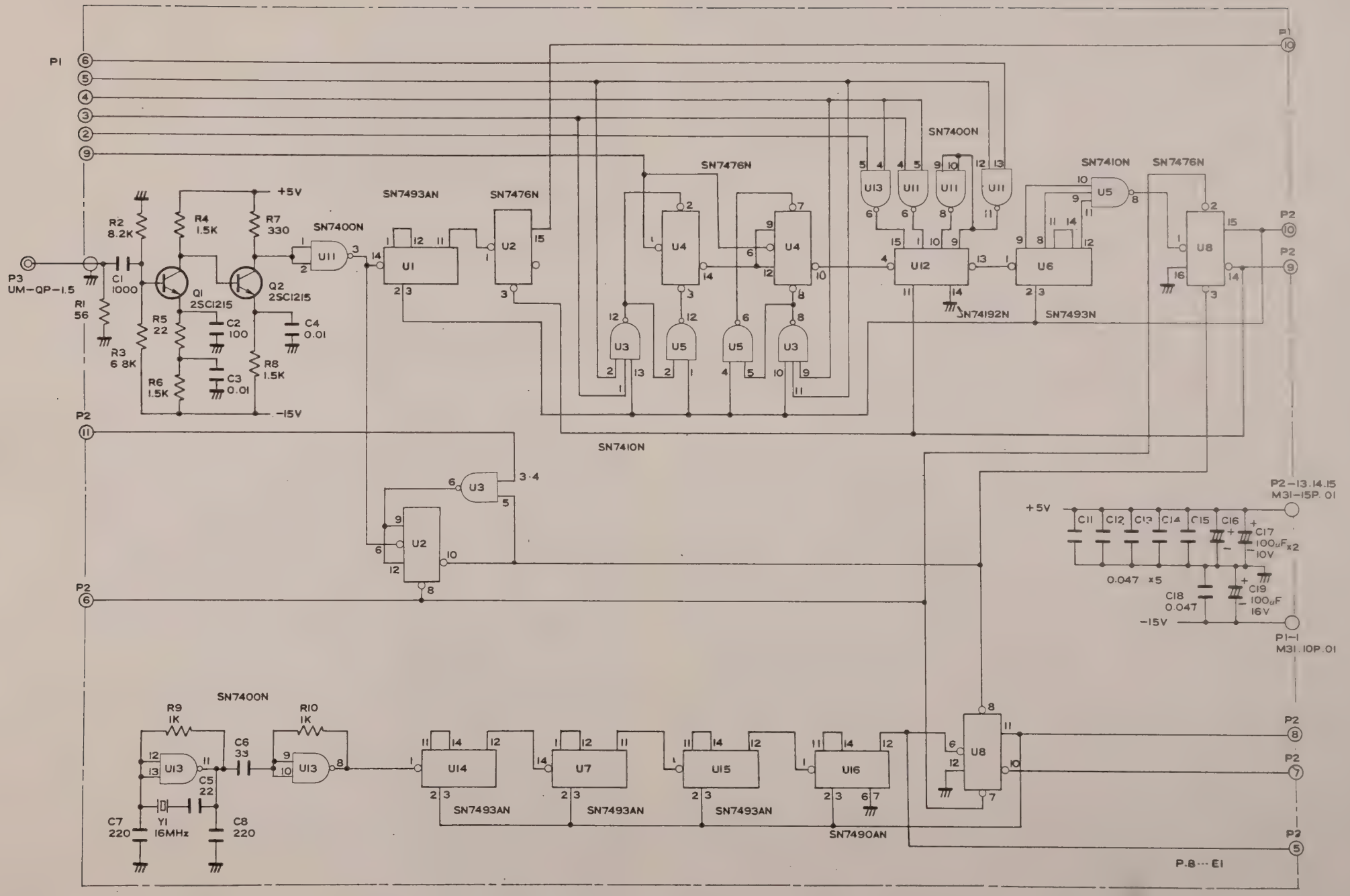

P1 ② SWEEP DRIVE
L1 SWP coil
R1 47
CR1 MA322
CR2 MA322
C1 68
R2 470K
R3 470K
U1 SN76514N
C20 0.022
C16 47μF 10V
J 0.022μF
L5
C1 0.022μF
C6 0.022
C7 0.022
R13 220
C19 0.01
L2 0.82μH
L3 1.0μH
R21 240
Q6 2SC1215
R22 100
C34 0.01
C11 33
C12 6
C13 47
C14 2
C15 33
C35 22μF 16V
R24 470K
Q6 2SA564A
Q3 2SC1215
Q4 2SC1215
C10 33
R14 120
R15 1.82K ±1%
R16 1.82K ±1%
C9 47
R12 430
C8 0.022
I7 22K
R18 2.2K
Q5 2SC828A
R25 10K
R23 1.24K ±1%
Q1 2SC1215
Q2 2SC1215
R5 10
R6 10
C2 4
C3 4
R7 33K
R8 33K
R9 12K
R10 3.3K
R11 6.8K
C4 22μF 16V
C5 0.022
C41 4700
R51 1.21K ±1%
C43 0.01
R56 340 ±1%
C45 0.022
R61 137 ±1%
C47 1μF
RF OUT
J1 BNC-090
CR11 MA56
R52 10.2 ±1%
R53 11.5 ±1%
C44 1μF
CR13 MA56
R57 22.1 ±1%
R58 37.4 ±1%
C46 1μF
CR15 MA56
R62 22.1 ±1%
R63 68.1 ±1%
C4 1μF
CR12 MA56
R54 LOOK ±1%
R55 200 ±1%
R59 LOOK ±1%
CR14 MA56
R60 200 ±1%
R64 LOOK ±1%
CR16 MA56
R65 562 ±1%
C48 0.022
L7
-15V P1 ③
C51 0.022
C52 0.022
R66 2.2K
R67 15K
Q11 2SC828A
Q12 2SA564A
R68 220
R69 18K
Q13 2SA564A
R70 6.8K
R71 2.2K
R72 2.2K
R76 2.2K
R77 15K
Q14 2SC828A
Q15 2SA564A
R78 220
R79 18K
Q16 2SA564A
R80 6.8K
R81 2.2K
R82 2.2K
R86 2.2K
R87 15K
Q17 2SC828A
Q18 2SA564A
R88 220
R89 18K
Q19 2SA564A
R90 6.8K
R91 2.2K
R92 2.2K
C53 47μF 16V
C54 0.022
C55 0.022
P1 ⑦ GND
L6
L8
P1 ⑥ +5V
C56 0.022
C57 47μF 10V
C58 0.022
(40dB)
(20dB)
(10dB)
P1 ⑩
P1 ⑨
P1 ⑧
L4 75 MHz OSC coil
C21 27
CR5 1SV34
R36 10K
R35 1.2K
R31 33K
Y1 75MHz
Q7 2SC1215
C22 15
R33 10
R32 10K
R34 1.5K
C23 150
C24 47μF 16V
C25 0.01
C29 0.022
CR6 MA150
U2 μPC157C
126 100
R3 100K
C27 1000
R38 33K
C28 0.022
R39 100K
R40 680
R42 15K
R43 5.6K
CR7 1SS16
R44 681
C30 1000
CR8 MA150
R41 820
C31 0.01
R45 120
C32 0.1
R46 56
C33 0.022
J2 UM-QR-1 RF SAMPLE-OUT
P1 M34105-13
(BLK)
(SWEEP DRIVE)
(-15V)
(LEVEL)
(N.C)
(+5V)
(GND)
(10 dB ATT)
(20 dB ATT)
(40 dB ATT)
R27 2.2K
CR8 M 150
R114 20K
R111 12K
R115 0
R112 10K
R125 1K
CR7 MA150
R126 15K
CR6 MA150
R113 27K
R118 15K
R120 100K
CR4 MA150
R122 39K
R123 10K
C15 1000
U4 μPC157C
C13 1000
C14 68
R132 2K
R133 750
WIDTH
R134-a 10K
SAWTOOTH
R128 30K
R135 0
R134-b 10K
CENTER
R130 8.2K
R131 0
R139
A1 ASSY
R106 1K
R107 10K
R3 10K
LEVEL
R108 100
R109 5K
A2 ASSY MONITOR P.B E1
BLK P1 ①
LEVEL P1 ④


P1 ⑥ +5V
P1 ⑦ GND
L1 SWP coil
L2
L3
L4
L5
C15 47µF 10V
C16 2200
C17 2200
C18 2200
C19 47µF 10V
P1 ② SWEEP DRIVE
P1 ① BLK
P1 ④ LEVEL
J2 UM-QR-1
RF OUTPUT
J1 BNC-080
Q1 2SK19
Q2 2SK19
Q3 2SC828A
Q4 2SC828A
Q5 2SC1215
Q6 2SC1215
Q7 2SC1215
Q11 2SC828A
Q12 2SA564A
Q13 2SA564A
Q14 2SC828A
Q15 2SA564A
Q16 2SA564A
Q17 2SC828A
Q18 2SA564A
Q19 2SA564A
U1 µPC157C
U4 µPC157
CR1 MA322
CR2 MA322
CR3 1SS16
CR4 1SV34
CR5 MA150
CR6 1SS16
CR7 MA150
CR8 MA150
CR11 MA86
CR12 MA86
CR13 MA86
CR14 MA86
CR15 MA86
CR16 MA86
CR17 MA86
CR18 MA86
(40dB)
(20dB)
(10dB)
P1 (BLK)
-15V (SWEEP DRIVE)
(-15V)
(LEVEL)
(N.C.)
(+5V)
(GND)
(10dB ATT)
(20dB ATT)
(40dB ATT)
WIDTH
SAWTOOTH +5V
CENTER
LEVEL
A1 ASSY
A2 ASSY MONITOR P.B. E1

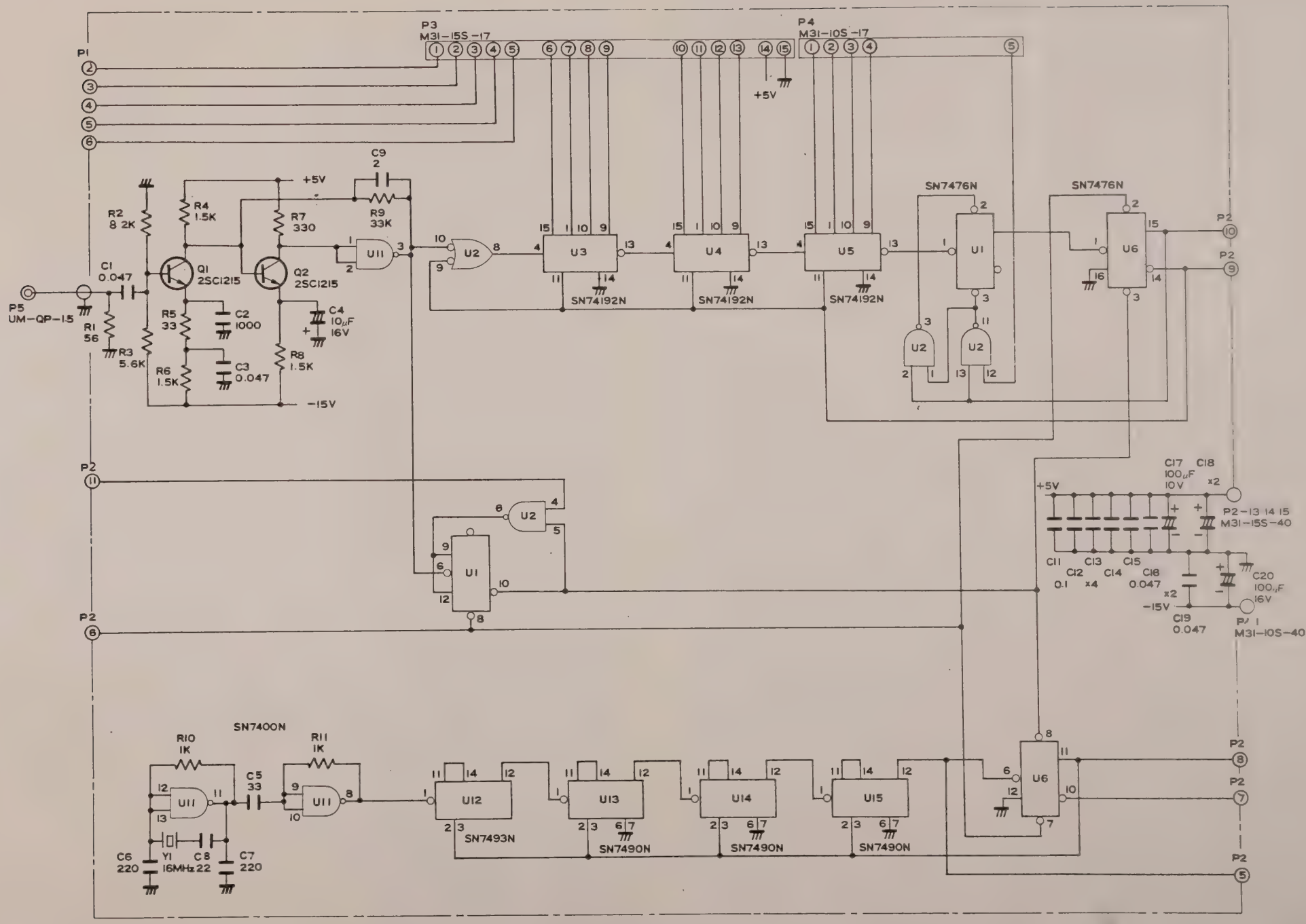


	C9	C10	C11	C12	C13	C15	C33	CR20	R1	R2	R3	R4	R5	R33	R34	R39
VP-8811A	0.47	0.47	0.47	0.47	0.47	0.047	—	—	22	22	22	22	22	820	22K	0
VP-8812A	4.7μF	4.7μF	4.7μF	4.7μF	4.7μF	—	—	—	100	100	100	100	100	0	—	0
VP-8813A	2.2μF	2.2μF	2.2μF	2.2μF	2.2μF	—	2200	MAI50	100	100	100	100	100	0	—	0
VP-8814A	1μF	1μF	1μF	1μF	1μF	—	2200	MAI50	47	47	47	47	47	0	—	0

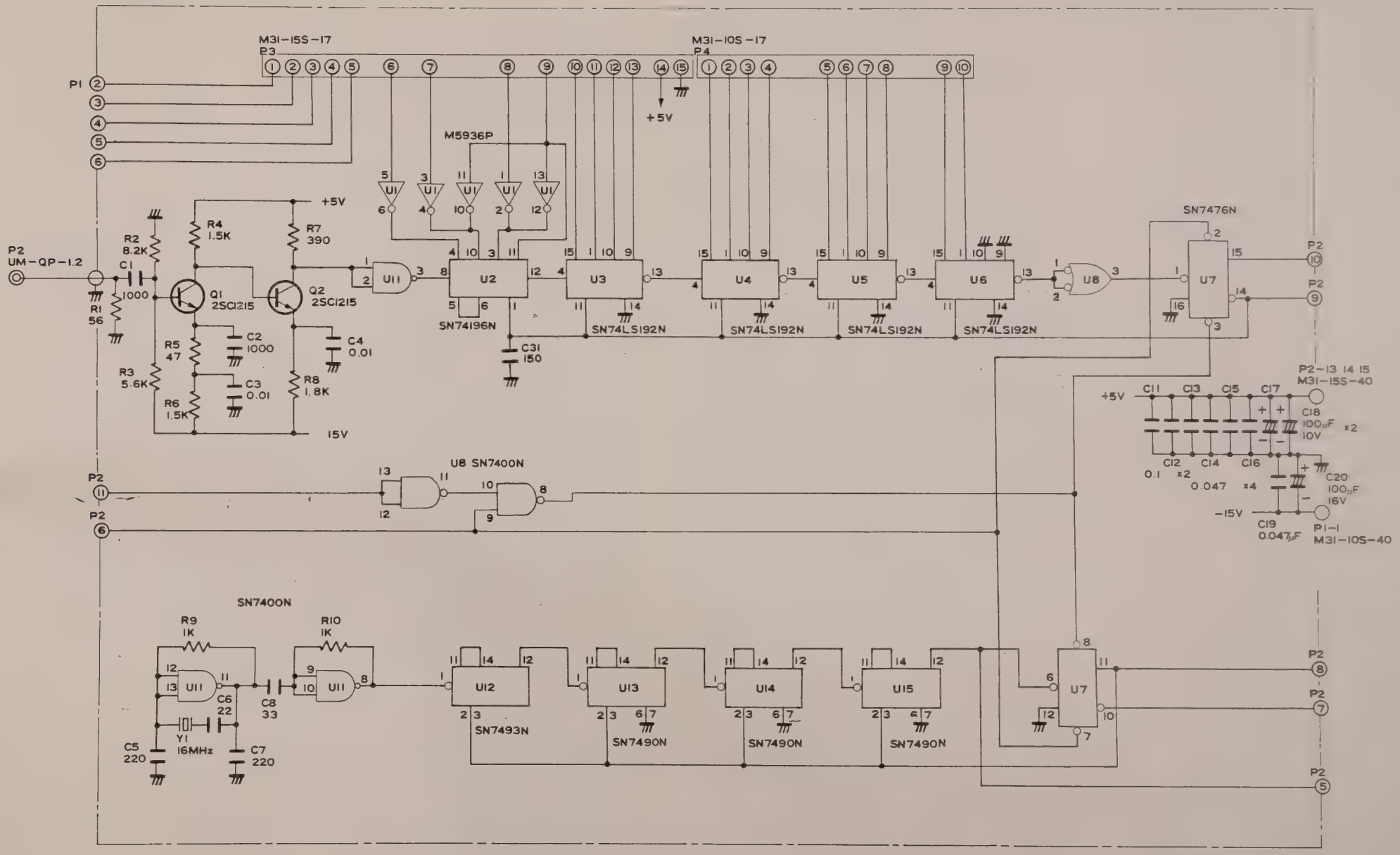
VP-8911A to VP-8914A MARKER (1)



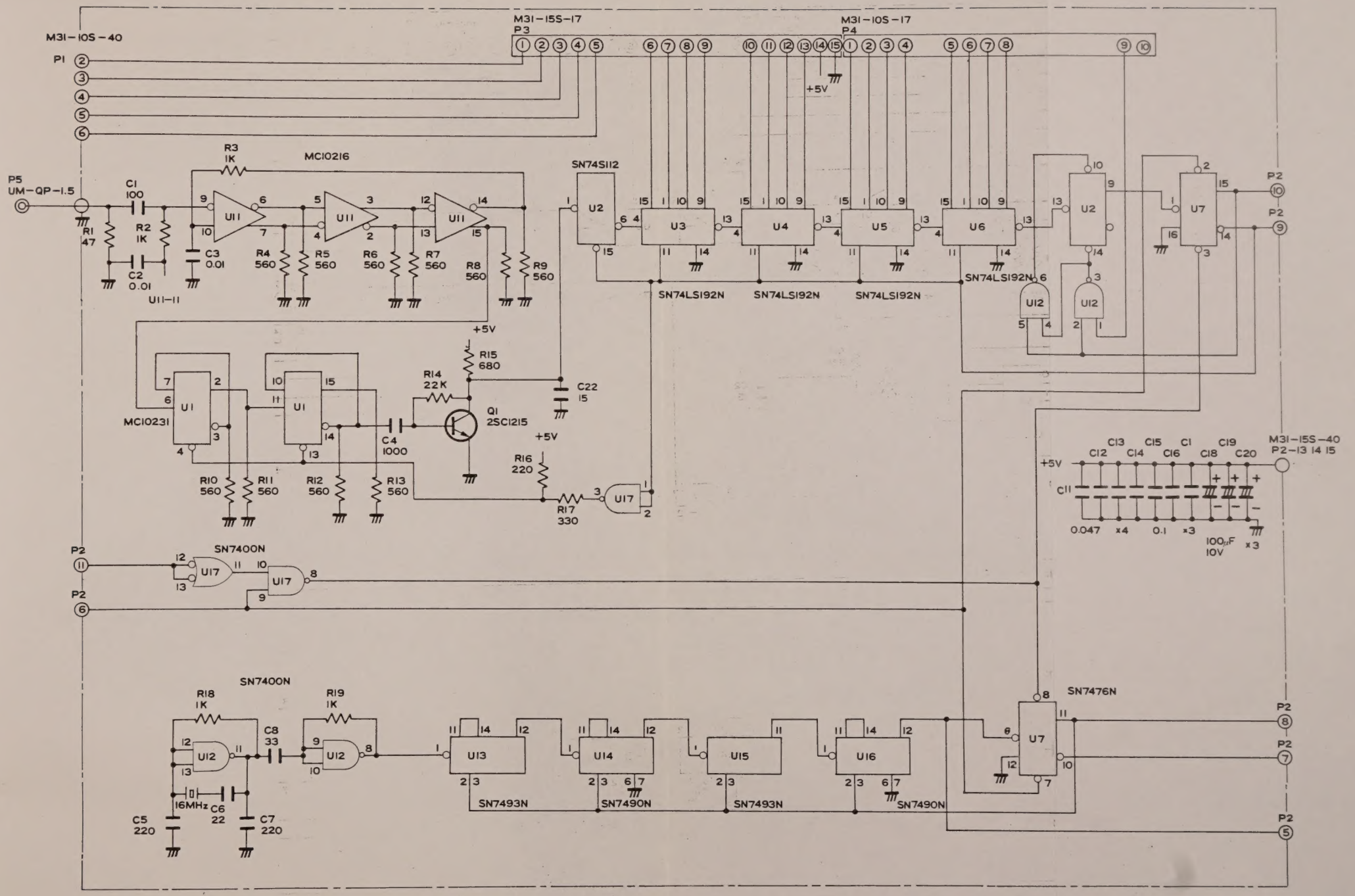
VP-8911A IF MARKER (2)



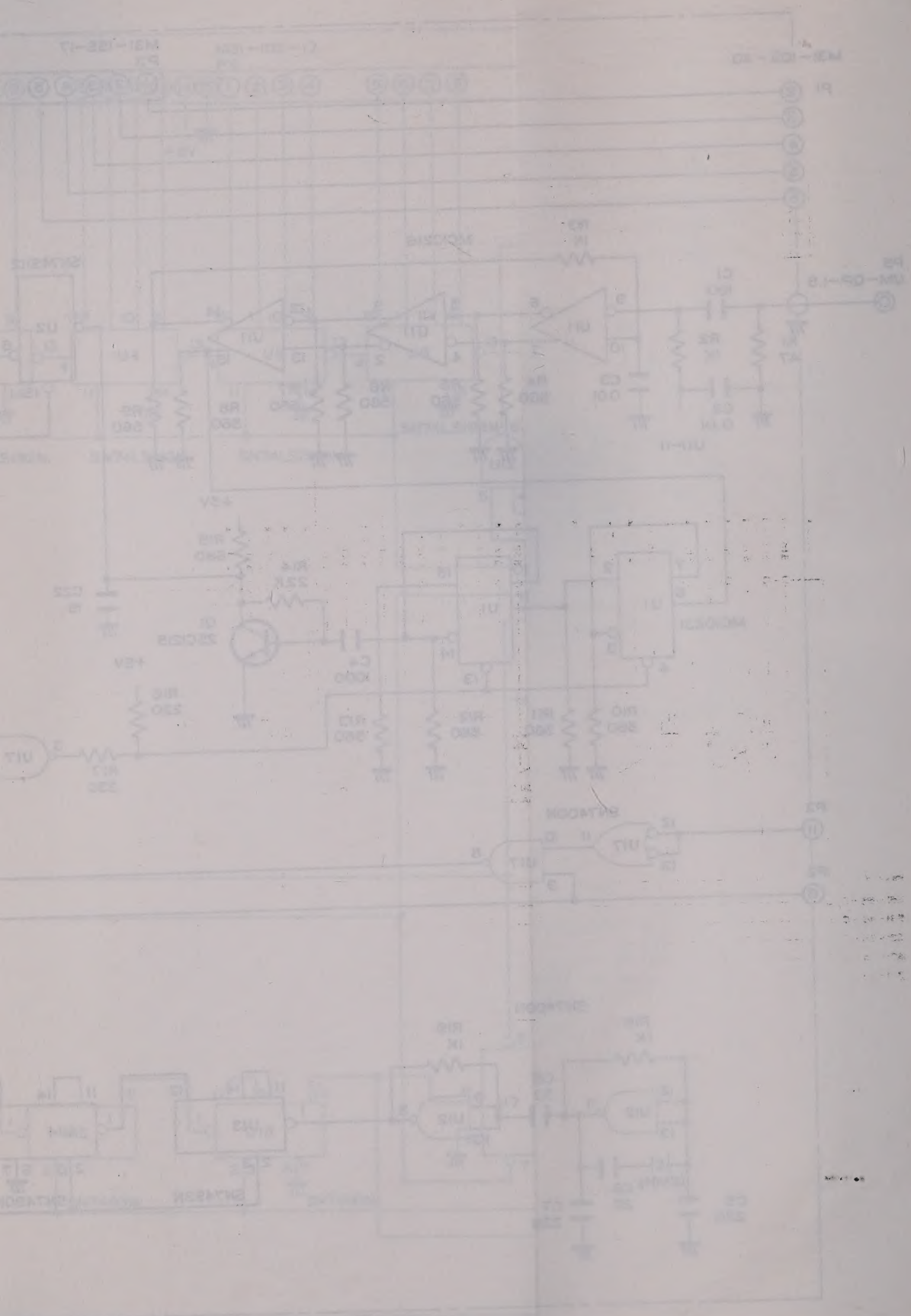
VP-8912A L W MARKER (2)

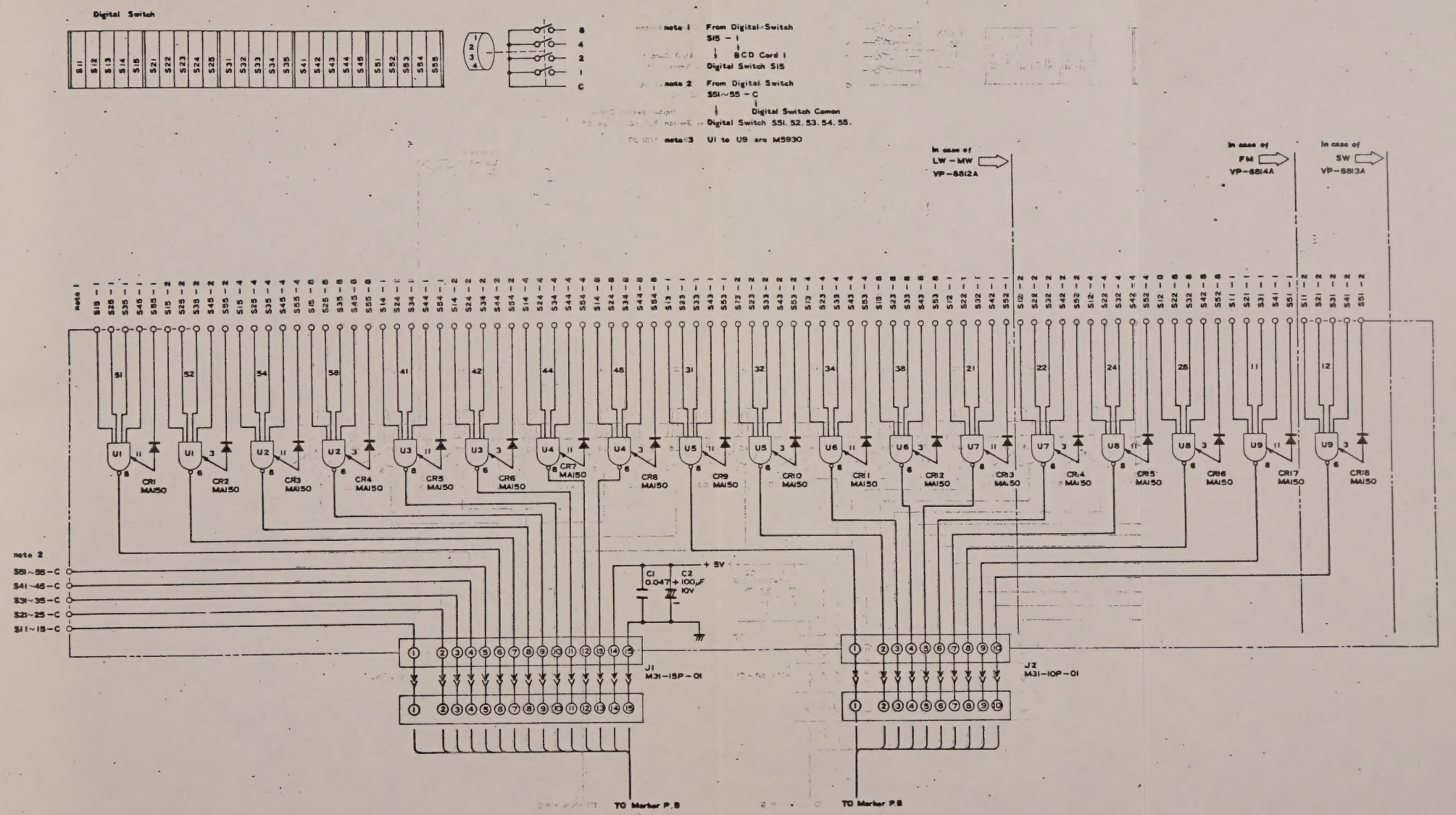


VP-8913A SW MARKER (2)



VP-8914A FM MARKER (2)





VP-8911A to VP-8914A MATRIX